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Dog Distemper Antiserum.*

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To-night we desire to bring to your notice some of the properties of distemper antiserum, and describe a method by which immunity may be induced in susceptible dogs, namely, by the use of a hyperimmune homologous serum and living virus.

The use of immune serum both for the prevention and treatment of dog distemper is not new, but the results following the use of the majority of such sera have not been very encouraging. The majority of these sera (until quite recently all of them) are prepared by immunising some large animal, such as a horse, with bacteria or bacterial products of various kinds. The organisms employed have been chosen because they were regarded by the authors as the true infective agent in distemper or because they were commonly encountered in cases of that disease and could be regarded as secondary infective agents.

The following examples of antibacterial sera which have made their appearance on the market, may be mentioned :—

(1) *Serum Gans* : This is a polyvalent heterologous serum prepared by immunising horses against bacteria isolated from cases of distemper, and fresh strains are from time to time secured for this purpose.

(2) *Serum Piorkowski* : This serum is prepared nowadays by immunising horses against the organism originally isolated by this worker and named after him.

(3) *Antistreptococcal Serum* : In this case horses are immunised with streptoccci and the polyvalent antistreptococcal serum of the Pasteur Institute has been used. It may also be mentioned that anti-strangles serum has been used fairly extensively in dog distemper. The serum of Dassonville and de Wissocqu (Serum, D. W.) was originally an anti-strangles serum and this has been employed extensively on the continent in the treatment of distemper.

(4) Serum prepared from horses by immunising against *B. bronchisepticus*.

As you are all aware, we believe that the primary infective agent in dog distemper is the virus first described by Carré and on that account we consider that these antibacterial sera are of quite limited utility. If it is known that *B. bronchisepticus*, for example, is complicating a case of distemper, the administration of an appropriate antiserum is perfectly rational, but the injection of such a serum into every case of distemper can only lead to disappointment.

In addition to these heterologous sera there are three homologous sera on the market now which are designed to antagonise the virus infection, and they are as follows :—

(1) The homologous serum of the Cutter Laboratories, U.S.A., is made by hyperimmunising dogs, but there is no published description of the method of its manufacture nor any account of a method of standardisation. The manufacturers state that a single dose of from 10 to 30 c.cm. of serum will give passive immunity and that the serum should prove useful in the treatment of early cases. Dr. Wood, of the Cutter Laboratories, kindly informed us in a personal communication that the serum is made by injecting a single massive dose of virus into immune dogs and harvesting the serum " about 12 " days later. Pooled serum from many animals is tested for sterility, and " from time to time " for protective power on susceptible puppies. " Simultaneous injection " of serum (10 and 15 c.cm.) and virus is employed. Considerable difficulty is found in securing suitable animals for these tests.

(2) Ashe, Lockhart, Ray and Barbee (1925) announced the production of a homologous antidistemper preparation (later stated to be a serum) but they gave no information regarding the technique of its manufacture or standardisation. This serum, combined with an antigen (the nature of which was not disclosed) was found by them to give a durable immunity. This double inoculation method of protection was tested later by Skidmore and Buckley (1926) who did not secure such favourable results as the originators of the method.

(3) Nusshag and Stecher (1929) published an account of an antidistemper serum prepared in dogs by hyperimmunising with virus and certain unspecified bacterial antigens. No precise record of the hyperimmunising course for the manufacture of the serum is published and no evidence of standardisation is given save this, that a dose of 10 c.cm. of serum should protect a susceptible dog against distemper infection for a time, and larger doses than this—repeated if necessary—should prove valauble in the treatment of the disease.

It may be noted that Nusshag and Stecher have attempted to combine an antiviral serum with an antibacterial so as to improve the product for treatment purposes.

It will be observed that two of these groups of workers select 10 c.cm. as a standard dose of serum for the production of passive immunity. In no case, however, is one told exactly how the serum is prepared and what steps, if any, are taken to standardise the product with a view to issuing a serum of high and known potency. It will be clear to everyone here that unless an alleged hyperimmune serum can be standardised its protective value will necessarily be variable and at times inferior. A few experiments have been performed to test these three sera, but the results indicate that none of the samples tested was of high potency.

The work of others was not of great assistance to us in our search for the best method of producing hyperimmune serum of good quality, though the very existence of commercial sera certainly encouraged us in our quest. After many disappointments we secured some samples of serum

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which convinced us that it was possible to prepare serum with very valuable protective powers. It was, however, not at all easy to determine what was the best method to adopt in order to secure serum of good potency at will, nor was it obvious what was the best and most economical method of testing and standardising the serum after it had been secured. These two points are really intimately connected for, without some reasonably accurate method of assay of the potency of a serum, it is impossible to determine the best method of manufacture, and unless some simple and rapid method of test can be devised it is impossible to follow the course of immunisation from day to day.

A discussion of these points and the difficulties that are encountered is rather out of place here and those who are interested will, we hope, find a description in the forthcoming number of the *Journal of Comparative Pathology and Therapeutics*. Suffice it to say that we believe that we ultimately succeeded and that it is now possible to prepare potent serum regularly and guarantee by certain tests that the product shall reach a certain standard of efficiency before it is issued for use.

The method of manufacture may just be outlined. Dogs which have been immunised against distemper or that have recovered from that disease are kept for at least a month without treatment. A large dose of potent virus (20 c.cm. of a 20 per cent. suspension of infective spleen and lymphatic glands) is injected subcutaneously into the dogs on two successive days. The response to the injections of virus is followed, by means of a serological reaction, on samples of blood withdrawn from the saphena vein. When the response appears to have reached a maximum the dogs are bled out under full anæsthesia and the serum collected in the usual manner. The rise of antibody content is usually very rapid under these conditions and serum may frequently be harvested within a week of the hyper-immunising injections. The serological test we employ would take a good deal of time to describe properly. It depends on complement fixation when virus, antiserum, and complement are incubated together. We have, even now, no proof that the complement fixing antibody and the protective antibody *always* go hand in hand, but we have found that the serological reaction is a very useful guide in serum work and so far we have never found a serum which was rich in complement fixing properties which was not also potent in protective powers. In every case the serum is also tested upon susceptible dogs before issue is permitted. (See *Journal of Comparative Pathology and Therapeutics* for full information on these points.)

One method which we have used for testing our sera also illustrates one of the utilities of serum in practice: Three puppies, preferably of the same litter and about three months of age, are selected and one of the group rceives subcutaneously a small dose of the serum to be tested on one side of the body, and a surely infecting dose of virus on the other side. The second puppy receives two to four times this dose of serum and the same dose of virus, and the third, being the control, receives virus only. In the experiments which we have conducted the result, in the case of potent serum, has usually been as follows: the puppy receiving the larger dose of serum is completely protected; the one receiving the small dose may show a small temperature disturbance on the third or fourth day but will suffer no ill-effects, and the distemper attack will be suppressed. The control which received virus only, developed a typical distemper attack. The results we have described will only be obtained with certainty when one employs (1) puppies of known susceptibility; (2) serum of high potency; and (3) virus which is living and potent.

Charts 1, 2 and 3 (exhibited) indicate in graphic form the results of such an experiment.

[Chart 1.—Almost complete suppression of distemper attack by means of 1·0 c.c. of hyperimmune serum.

Chart 2.—Complete suppression of distemper attack by 4·0 c.c. of the same serum.

Chart 3.—Typical distemper attack.]

In order to demonstrate the point that hyperimmune serum should be of the highest quality before issue takes place, we show here three charts (Nos. 4, 5 and 6, exhibited) which illustrate the effect produced in puppies when a dose of 10 c.c. of serum is given simultaneously with living virus—the serum being, in each of two instances, of indifferent quality. The dose in these two cases is more than twice that required when a highly potent serum is used. In the case of each serum treated dog (charts 4 and 5) there was considerable febrile disturbance, one of them reaching 104° F. for a day and showing certain clinical symptoms as well. Both of the serum treated dogs recovered, whereas the control dog died (chart 6).

We have evidence that the serum obtained from some dogs which had recovered from an attack, but which had received no reinforcing doses of virus, would protect when a dose of 10 c.c. was injected. It must not be assumed that all recovered dogs have serum of this potency because it is clear that there is considerable variation in the protective potency of the serum of such animals.

Many experiments with different batches of serum of good potency convinced us that simultaneous, side by side, inoculation of serum and virus was a safe procedure and we expected, from the analogous cases of immunisation against rinderpest and hog cholera, that the operation would lead to a durable immunity.

It was thus of considerable importance to ascertain the extent of the immunity conferred by the process dsecribed and the length of time it lasts. Charts 7 and 8 (exhibited) of dogs 63 and 64 will assist one in arriving at a conclusion on this point. Each of these two puppies received serum (2½ c.c. and 5 c.c. respectively) and virus on August 6th, 1930, and one month later were tested with a relatively large dose of virus and as will be seen, neither showed the slightest disturbance.

Results of this kind have been secured in all dogs which were tested three weeks to two months after the double inoculation of serum and virus. If these experiments are conclusive, and this is our belief, then we know that immunity conferred by the double technique lasts for at least two months and it is highly probable that it is life long. Experiments have shown that the passive immunity conferred by the injection of serum alone is of only a few days' duration and therefore the immunity after two months must be an active one elicited by the injection of living virus. We regard these dogs as very similar to those given vaccine and virus. Vaccines stimu-

lated the recipient to form a small amount of antibody and the living virus converted the resistant state thus induced into solid and durable immunity. In the cases we are considering prepared antibody is presented to the dog from the start and he is resistant from the outset. Living virus consolidates the resistance and converts it into immunity. We have no evidence as yet that the immunity will last for life, but we hope and expect that it will so prove to be the case.

A point of considerable theoretical interest and of some practical importance is the length of time that must elapse before a treated dog develops sufficient active immunity to protect him against accidental infection. Injections of large doses of virus at various time intervals after the double protective inoculation show that the immunity is only solid after three weeks. This test is a severe one as we, almost certainly, inject a quantity of virus greatly in excess of the amount that could be picked up in a natural infection and we are therefore of the opinion that in field practice an adequate immunity is probably established in a shorter time than this.

Apart from numerous experiments carried out at the laboratories a considerable amount of serum has been sent to veterinary surgeons (21 in all) but only 489 dogs and hounds have received the full treatment. Of these we have received no report concerning eight.

The immediate results of the double inoculation in the field are highly gratifying. One or two cases have been reported where the temperature has risen very high and it has been considered advisable to give an extra dose of serum. In no case, however, has there been serious illness or death.

One advantage of the method under consideration is that animals which are unusually sensitive and show distinct reaction to the virus may be given a further and larger dose of serum at the time when a high temperature is registered, and in this way the attack may be cut short. The temperature will fall within a few hours and the puppy show no ill-effects.

The administration of serum in the incubation period of the disease was also studied as a means of testing serum and because injection at this time was of great practical importance. For example, it is not inconceivable that veterinary surgeons will have cases brought to their notice with a history that they have been in accidental contact with known or suspected cases of distemper and advice is sought as to what is the best thing to do in order to avert an almost certain attack of distemper. We have tried the effect of serum given both two and three days after the injection of virus. The results have been uniformly encouraging with good serum and demonstrate that a high degree of protection may be afforded by adopting this procedure. The temperature chart (9, exhibited) of D.35 gives some idea of what one might expect when a dose of 10 c.c. of indifferently potent serum is given two days after infection. It will be observed that he showed a typical diphasic curve but recovered.

As a contrast against this consider D.34 (chart 10, exhibited) which received an equal dose of a highly potent serum three days after the virus and when, in fact, the first temperature rise had commenced. The attack was entirely stopped. Yet another puppy received 10 c.c. of the potent serum two days after virus (D.33, chart 11, exhibited) and, as will be seen from the chart, had practically no febrile disturbance at all.

The control dog (D.36, chart 12, exhibited) of this experiment developed a typical attack of distemper but recovered.

Possible Complications Arising during the Process of Inoculation.

These can conveniently be placed under three headings :—

(*a*) Unusually sensitive patients which develop an unlooked for febrile response to the virus.

Animals coming under this heading have already been referred to, but it may be as well to make further mention of them here, since they comprise an important class, although few are met with. If it is made generally known that such animals do exist, it is certain that whenever possible the practitioner will endeavour to obtain temperature records for a week following the inoculations so that he will be acquainted immediately any symptoms of an untoward nature occur. It may be said that such cases have so far caused very little worry and that a double dose, that is 10 c.c. of serum, given at once, corrected the position and by increasing the antibody content in the patient allowed the immunisation process to pass off without any further trouble.

(*b*) Puppies unwittingly inoculated when in the incubation period of the disease.

It is quite possible that animals coming under this heading form quite a formidable class, for it is not always easy or even possible to obtain an accurate history of the patient for a week or so prior to the injection period. In view, therefore, of the doubt which must exist in the minds of both owner and veterinary surgeon, it becomes more than ever desirable, if not actually necessary, to arrange for a record of bi-daily temperatures after the inoculations have taken place, so that the case may be properly and quickly treated if it becomes necessary.

(*c*) Puppies suffering from some febrile condition which is not suspected or reported at the time of inoculation.

We have no actual experience of animals which come under this class, but it is almost impossible that they have not been met with in the field by some of the 21 veterinary surgeons who have made use of this method of protection. It is quite possible, of course, that the presence of some unsuspected and possibly dormant condition at the time of inoculation might, by reducing bodily resistance, allow the virus to get the upper hand, but here again a further dose of serum given later should assist in overcoming the virus infection.

There is no doubt that the possession of a supply of potent serum gives the operator a sense of security in the earliest stages of the distemper attack.

Treatment.

The treatment of the established disease is a matter which continues to give veterinary surgeons worry and it therefore became a matter of the first importance that the value of hyperimmune serum in treatment should be ascertained. The information which has been described to you this evening, namely, that serum given in the incubation period appears to have a beneficial effect, indicates that serum given later, when symptoms are fully established, should be of value.

Let us pause first to consider some established facts regarding the course of the distemper in the dog. A millionth of a gram of infective spleen may infect a susceptible dog. At the height of the first febrile reaction 1/1,000 c.c. of blood may infect another animal; so that the virus has multiplied a million fold in four or five days, and in the later stages of the disease the virus has multiplied still further, probably a billion times. Clearly then, an antiviral serum, to have any chance as a therapeutic remedy, must be very potent and has a better chance of successful action the earlier it is given. We believe that every hour is of importance after infection has occurred and if treatment is only possible in the later stages it is essential that large doses of potent serum should be given at once.

We have evidence that 1/10 c.c. of our standard serum will neutralise 10,000 infective doses of virus when serum and virus are mixed together. Ten c.c. will therefore destroy a million infective doses. Put this way the figure sounds impressive, but it must be remembered that, measuring by the same scale, billions of doses may be required. We would emphasise that even under favourable conditions large doses are usually necessary.

The injection of large volumes of serum is inconvenient and therefore efforts were made to secure a still more potent product by recognised serum concentration methods and it has been found to be possible to secure a solution five times as potent as our standard. We hope that in the future this figure may be still further improved, and we propose to refer to this solution as concentrated antibody. (See *Journal of Comparative Pathology and Therapeutics* for details.)

The length of time which has elapsed since we commenced making use of concentrated antibody for treatment is too short and the number of cases too small to allow us to say very much, but though our information is scanty, it is being added to rapidly and a belief is gradually becoming a conviction that concentrated antibody is a very valuable remedy. A good hyperimmune serum is also of value in treatment.

The puppy, D.51 (chart 13 exhibited) which was originally the control dog of another experiment, became exceedingly ill on the eighth day after it had received the virus and was becoming rapidly worse and in our view would certainly have died. He had lost much of his original good condition, had a severe diarrhœa, containing small quantities of blood, and was vomiting. Fifty c.c. of a highly potent hyperimmune serum was given with 10 c.c. of normal saline intravenously, and there was an immediate serum reaction. The lips and eyelids became much swollen and irritable within a few minutes after the injection had taken place. These symptoms passed off in an hour or so and the day following the temperature was round about normal. The puppy never again developed pronounced temperature, but remained weak for several days; the diarrhœa also persisted but eventually he came back to his food and with no further treatment whatever made a complete recovery. This, as stated above, is the only case of advanced, uncomplicated distemper which we have treated with hyperimmune serum, as most of our tests have been made with concentrated antibody. Of these we have several cases which we could record, but two examples must suffice.

Chart 14 (exhibited) shows the temperature curve of a terrier which was brought up to the laboratories as a case of acute distemper. The precise duration of illness was uncertain. Blood was taken from the saphena vein and this was subsequently shown to be infective for a ferret. Ten c.c. of concentrated antibody was injected. The temperature soon fell to normal and recovery was almost uninterrupted. A very similar record has been secured in a few other cases.

Chart 15 (exhibited) shows that the result is not always so satisfactory. Here the immediate effect of serum seems excellent, but a relapse set in and we believe that too small doses of antibody were given during the relapse. However, repeated injections were followed by ultimate recovery.

Probable Limitations in Serum Treatment.

(1) In the later stages of the disease it may not be possible to inject sufficient antibody to overcome the virus infection with the products at present available; but only careful observation and many tests can elucidate this point.

(2) The cases of distemper complicated with secondary bacterial invaders remain a very difficult problem and it is possible that for these the appropriate heterologous sera originally referred to might prove to be valuable. The difficulty here is to know which of the many possible kinds of bacteria is giving trouble. If it is known that *B. bronchisepticus* is complicating the case the corresponding antiserum is indicated.

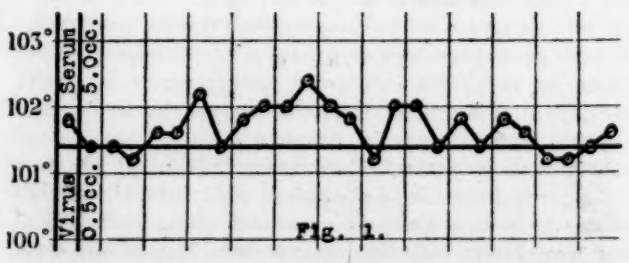
(3) Cases with nerve complications will probably be difficult to treat, for there is much evidence to show that the central nervous system is isolated from the rest of the body to such a degree that complex substances like serum protein cannot gain access to the nerve cells. It may thus prove to be the case that serum is useless for distemper encephalitis when given by the ordinary route. Intrathecal injections might be attempted, but on this point we have no definite information.

We hope we have said enough to convince you:—

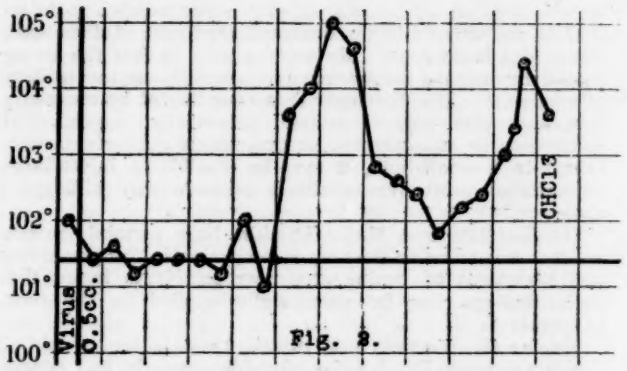
(*a*) That serum and virus, side to side, simultaneous, inoculations promise well for the protection of susceptible dogs. The duration of the immunity thus secured is, as yet, unknown, but we consider it should be as good as that resulting from vaccine followed by virus.

(*b*) That specific treatment of distemper by antiserum (at any rate in the early stages of the disease) is about to come forward as a practical measure.

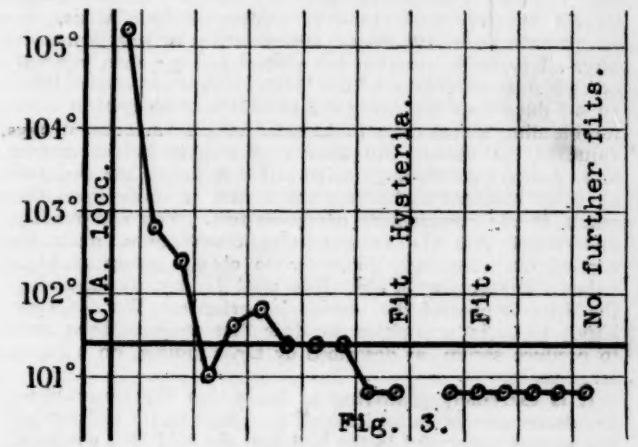
Note.—It is not practicable to reproduce all the charts shown at the meeting and four typical examples only are appended.



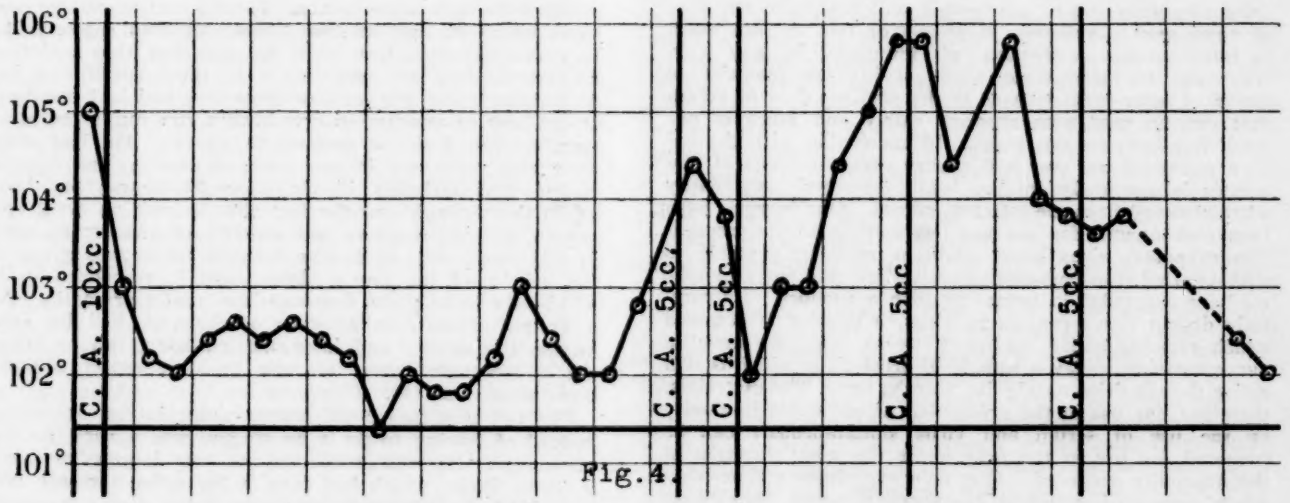
Temperature chart of puppy. Compare with Fig. 2. Virus one side, serum on the opposite side, at the same time. Complete suppression of distemper infection.



Temperature chart of puppy of same litter as puppy of Fig. 1. Virus only. Typical acute distemper attack.



Temperature chart of terrier. Brought up to the farm with developed distemper, duration of illness uncertain. Effect of one dose of concentrated antibody. (C.A. 10 c.c.)



Temperature chart of Labrador. Duration of illness uncertain. Immediate beneficial effect of concentrated antibody. Relapse, ultimate recovery after repeated doses of antibody.

For C.A. 5 c.c. (last dose) read 10 c.c.

References.

Lockhart, Ashe., Ray, J. D., Barbee, J. S., 1925. *J. Amer. Vet. Med. Ass.*, lxvii, 668.

Skidmore, D. I., Buckley, J. S., 1926. *J. Amer. Vet. Med. Ass.*, lxix, 218.

Nusshag, W., Stecher, H., 1929. *Tierarztl. Rdsch.*, xxxv, 165 and 195.

Discussion.

The President (Captain Dunlop Martin) now called on Major T. Dalling to open the discussion on the paper.

Major Dalling thanked the Chairman for the opportunity given him of making a contribution on the subject of Distemper Serum. He heartily congratulated Dr. Laidlaw and Major Dunkin on their brilliant bit of work. Continuing, he said:—"Those of us who are privileged to be associated with these two workers in their researches know well the value of any work they do, because it is only after the most thorough exploration of the subject that they arrive at their conclusions. This latest report now presented by Dr. Laidlaw is yet another example of the results of their careful, critical and painstaking researches and we all look forward with the keenest interest to the detailed account of their work in the paper about to be published.

My colleagues and myself, as you know, have been interested in distemper both from the scientific aspect and also from the point of view of being able to produce the various products for issue to veterinary surgeons. Naturally, being associated with Laidlaw and Dunkin and knowing of their experiments concerning the production and use of serum, we have for the last month of two also carried out experiments on the same subjects. It is a pleasure to acknowledge the help and advice received from these workers and to be able to state here that we agree entirely with what has been told us to-night. (Applause.) A hyperimmune serum possessing antibody for the distemper virus can be produced.

Like Laidlaw and Dunkin, we explored the various methods which could conceivably be used in the production of such a serum, and, while by most methods tried sera even of high value could be obtained, we soon came to the conclusion that the method as described to-night by

Dr. Laidlaw yielded the most consistent results. Dogs known to have been infected with distemper virus, or which have been immunised, are rested for at least a month after all systemic reaction has passed and are then injected on two successive days with a large amount of potent virus. In 4-7 days they are ready for bleeding. The critical time for bleeding seems most important, for the variation in the value of the serum will alter considerably in the course of 24 hours. At the suggestion of Dr. Laidlaw the decision at what moment to harvest the serum is made upon the result of the complement deviation test. You can readily understand that the most careful observations must be carried out constantly in order to obtain serum of high value. The quality of the virus used for hyperimmunising the dogs is also of the utmost importance. We are very happy to be in a position to state that we have been able to produce serum, as described by Dr. Laidlaw, on a fairly large scale.

It is extremely gratifying to learn that the serum-virus simultaneous method of immunising dogs against distemper has proved successful in the hands of the Mill Hill workers. We also have experimented on these lines and several hundred dogs in many parts of the country have been treated with serum and virus prepared by us. As far as we are aware, the animals so treated have done well. For such work the two essentials are a potent serum and a potent virus. The amount of serum injected does not seem to matter much, provided it will neutralise the dose of virus used. Amounts in excess of this do not seem to influence the production of immunity in any way. Naturally, in large scale work, it is very essential to arrive at some conclusion as to the smallest dose of serum that can be used with absolute safety and much of our work has been on this point. In connection with the use of a potent virus, you will realise that the virus of distemper is extremely fragile, being destroyed very easily when removed from the infected animal. Our energies have been concentrated for the past few months on the preparation of potent virus in a condition sufficiently stable to withstand all transport difficulties and, after many attempts, we have succeeded in preparing such a product. By carefully drying tissue containing virus, a powder is obtained which remains active for many weeks, *e.g.*, we have in our possession to-day a sample of dried virus which is still active though dried nearly five months ago. The materials, therefore, for use in the production of an active immunity by the use of serum and virus simultaneously can be prepared for use in the field under the usual duration of the immunity produced. Our own experiments show that when pups so immunised are tested a month later, they are found fully immune: Dr. Laidlaw tells us that he has tested after an interval of two months and found the treated pups solidly immune. Time only will give the true answer. The method will, doubtless, appeal to veterinary surgeons in that there would appear to be a greater feeling of security in its use, for should an unduly severe reaction occur, the injection of a further dose of serum will put things right and, also, the two inoculations are made at one and the same visit.

Dr. Laidlaw tells us of the use of serum in dogs already infected with distemper. His experiments indicate that serum injected up to three or four days after virus will either prevent or modify any reaction. Our experiments would appear to bear this out also. Serum given on the first and second days following virus will usually prevent all reaction. Given on the third or fourth day, even when a temperature reaction is present, the intravenous injection of serum will modify the reaction at once. It follows, therefore, that serum given sufficiently early after exposure to natural distemper, or even after the first symptoms have been noted, will prevent the disease entirely or may effect a cure.

We have records of the field use of serum. One such record may interest you. In a group of six puppies, one showed symptoms of clinical distemper. It was removed and injected with serum. (This puppy actually died—it was in the days before we knew much about the best methods of using serum: its blood was shown to contain distemper virus). One other puppy showed a temperature of over 105° F.—the other puppies appeared normal. All five were injected with serum and all did well, no further evidence of disease being seen. In dogs known to have been in contact with a distemper case or exposed to infection in any way or in the uncomplicated case of distemper, serum should do good. My own opinion is that the serum should be injected intravenously, especially in the already affected case. The distemper case complicated by secondary infections will not, of course, necessarily respond. If serum can be concentrated so that much antibody is contained in a small bulk, it may be possible to inject large amounts of protective substance intravenously with great ease.

Dr. Laidlaw and Major Dunkin have certainly passed another milestone on the way to perfection in the prevention and treatment of canine distemper and it is hoped that their findings can be successfully applied in the field. (Applause.)

Mr. F. H. Stainton said that he thought they would all desire to thank Dr. Laidlaw for his masterly and concise account of what must represent a vast amount of work. (Hear, hear.)

Practically speaking, his own experience prompted him to express absolute and unqualified confidence in that serum and virus inoculation, and he had several reasons for saying that. In the first place, and he supposed the most important, they had had no accidents and no undue symptoms of any consequence. The dogs so inoculated had stood up to it, and in some cases had been subjected to very severe tests. But while he said that they had had no symptoms of any importance, he must admit that in, he supposed, fifty per cent. of cases they had had reactions of one sort or another—nearly always running a temperature, as Dr. Laidlaw seemed to expect. He had only been really anxious in one case, in which the dog—a cocker—was seriously ill for about 24 hours; but here again that brought out the fact that in such an event one always had the support and security of the serum, and in this case a dose of double strength serum was given at the height of the dog's illness, and it responded to it within six hours; the response was really dramatic. As a matter of fact, in no case of the sort had he ever known the serum, and later the antibody, fail to bring the temperature down; actually he could report 100 per cent. success so far. (Applause.)

The fact that they could protect a dog in one operation, instead of having to do it by stages, was a very distinct advantage. He well recollected one very impressive case: a Great Dane, which had been ill for quite a month and was, in fact, moribund—in the ordinary way one would not have expected him to have lasted the night. They were fortunate enough to get some concentrated serum from Dr. Laidlaw, and the animal received 15 c.c. at night. At the time, that dog's temperature was 106° F.; he was collapsed and had not looked at food for some time. The fact was that that dog was standing up and feeding next day, with a normal temperature, and he had never looked back. (Hear, hear.) He would quote another case of the kind, because his experience led him to believe that the serum was bound to be useful as a curative, quite apart from its immunising properties. A bulldog received the vaccine-virus treatment last November. About three weeks ago it came in, having had a series of rather bad fits. It received 15 c.c. serum and next day, or the day after, it got antibody. It was also heading for pneumonia at the time, but that dog had recovered. He was quite convinced that it would not have done so in the absence of that serum treatment.

As regarded reaction, that appeared to be a question of the individual. Some time ago he inoculated three Alsatians out of the same litter, and the temperatures of two of them were not raised at all, while the other rose to 104° F. for 24 hours; that was probably an idiosyncrasy, which could not be guarded against.

He could not sit down without expressing his appreciation of the never-failing help and advice which was always forthcoming from Mill Hill, and he thought that many of his hearers could endorse that. (Applause.)

Mr. D. E. Wilkinson observed that he could fully endorse what Captain Stainton had said, having been supplied with several doses of the serum and virus by Dr. Laidlaw and Major Dunkin. The first time he used it was on a dog which had been sold to go to America eight days later, and there was no time to adopt the routine vaccine and virus treatment. He consulted Dr. Laidlaw and Major Dunkin over the 'phone and they, with their customary kindness, said that they could supply him with serum and virus at once, and they would suggest that, as the dog was going in company with a number of dogs brought from all parts of the country and would thus be likely to be exposed to infection, it would be wise to give him a double dose of serum at the same time as the virus. He knew that that dog had arrived safely and well.

He did notice one thing: with the first two groups that he did with that treatment he always got a temperature reaction for about a week. At that time he took no notice of it, because he was not aware that Major Dunkin did not expect a temperature reaction with this treatment; nevertheless, with all the animals he had inoculated he had looked after them as though they were ill, and they all made good recoveries. The last group he did was a group of five dogs, of all sorts, including a mastiff puppy, and that was the only one to run a temperature.

Major Dunkin had said that in the dog the dilution of serum might perhaps be so great that an additional dose of serum might be advisable, but none of those dogs had given him the least trouble, and he was quite certain that two of the first group, at least, had been exposed to distemper infection. He endorsed fully all that Captain Stainton had said concerning the enthusiastic helpfulness of Dr. Laidlaw and Major Dunkin. All who had had anything to do with Mill Hill felt extremely grateful for the unfailing courtesy and kindness which had always been extended to them by those gentlemen. (Hear, hear.)

Dr. R. A. O'Brien (Wellcome Physiological Research Laboratories, Beckenham) thanked the Society for affording him the opportunity of being present upon what was an historic occasion. (Hear, hear.)

Dr. Laidlaw had described the work which he and Major Dunkin had carried out, and as he (Dr. O'Brien) listened he was amused at the manner in which it was all made to appear so simple; each step followed quite obviously from the preceding one, and anybody could have done it! (Laughter.) He had been at that kind of work for some years, and he realised the immense amount of hard work and skilled thought that had gone to produce that latest step of making the serum.

There were only three other anti-virus sera in general use: rinderpest, hog cholera and foot-and-mouth disease sera. Dr. Laidlaw and Major Dunkin had put a fourth on the map, and he thought it was no misuse of words to say that that was an historic occasion in the serology of animal disease. (Applause.)

Dr. A. L. Sheather observed that rinderpest had been mentioned two or three times that evening. He had had no experience of distemper, but the mention of rinderpest had taken him in mind back to India, and the first point that struck him was that the temperature reaction to the distemper virus seemed to resemble that produced experimentally with rinderpest virus very closely. The difference was that with the distemper virus one got a diphasic reaction.

His colleague, Shilston, who unfortunately died while he was doing the work, was dealing with the question of whether one could prevent reaction to the virus of rinderpest by giving a sufficiently large dose of serum without loss of immunisation. He did not publish his results, but he found that you could give a dose of antiserum which was sufficient absolutely to block out any evidence whatsoever of reaction to virus. Those animals were still immune two years later. The question here was a little different, because, as had been pointed out, one could not get as potent sera for dogs, but it would be interesting to know whether one could block out the virus reaction and at the same time confer an immunity. He thought that Dr. Laidlaw was probably right: that an immunity so produced was life-long—at all events, it was in rinderpest. Another point was in connection with the intravenous injection of the antiserum: was there any risk in injecting serum from one dog into the circulation of another dog?

At Muktesar an attempt was made to simplify the process of hyperimmunisation against rinderpest by direct transfusion of virulent blood from virus producers to serum producers, and though the animals were of the same species, namely, hill bulls, a very high percentage of the animals receiving the transfusions died from anaphylactic shock within a period measured in seconds or minutes.

Professor G. H. Wooldridge said that he had listened with great interest and admiration to Dr. Laidlaw's account of their work in connection with that serum production, and he must confess that his attitude towards it was one of undisguised hopefulness. (Hear, hear.)

He must approach it entirely from the point of view of the future, and of the help it was going to be to them as a profession in the course of their work. It seemed to him that in regard to its practical application veterinary surgeons should be very grateful indeed for it, because it would safeguard them so immensely in their hospitals and infirmaries, where dogs were introduced for the treatment of other conditions altogether; they knew the dangers that were run in regard to the development of distemper while in hospital and the financial responsibility which they were expected to accept under those circumstances. Supposing an action was taken against one for negligence, even if one won the case it simply meant that there had been very great expense in achieving that verdict. Now, however, it seemed to him that they would be able to make themselves free from that anxiety and danger: he thought that as a routine measure it would ultimately become the practice of the veterinary surgeon to inject a dose of serum into all young dogs—at any rate upon introducing them into his infirmary for any reason whatsoever.

The same thing applied, too, under certain conditions, to shows. If an injection of serum were made immediately before a dog went to a show, one knew he would weather the storm of possible infection at that show.

Another great advantage that Dr. Laidlaw had pointed out to them was the advantage they might get from the use of serum in the early stages of distemper, or after exposure to infection: it seemed that the serum might, in certain circumstances, overtake the virus. He was rather sorry, though not surprised, to hear that the authors of the method did not, for the present at any rate, hold out much hope in regard to the nervous complications of distemper and their treatment, but it did occur to him to ask whether or not there would be any special advantage in the subdural inoculation of the serum in some of the cases of early encephalitis. A point which would still have to be proved by time would be as to whether or not any of the cases treated with serum and virus were likely to develop chorea subsequently. He asked that because he had had two cases—one a very marked one—in which immunisation by the vaccine-virus was, in three months, followed by a severe attack of chorea, for which the dog had ultimately to be destroyed, and, judging from the history of the case and the details which he had before him and continued observation of the dog, there seemed to be little or no doubt that that chorea was the result of the virus inoculation. He was not blaming the virus at all in that respect, because he felt perfectly certain that if an odd case of that kind did occur there must be hundreds in which the complication which would otherwise have arisen was actually prevented.

He would like to ask another important question bearing upon the work of the clinician: when the serum and virus were injected it was obvious that there was, for some space of time, living virus in that animal's blood. The question was, could it be demonstrated how long that dog was likely to remain infective? It appeared to him that for a period of time it might be infective, so that there should probably be a period of isolation in order to protect other dogs with which that animal might be brought into contact, and it should not be assumed that because it had

been protected it was immediately safe to mix it with other dogs.

He presumed that the cost of the process would be somewhat heavy, as a dog could not yield an enormous amount of serum—and he was wondering whether there would be any advantage in not completely bleeding out the dogs, and what amount of potency their serum would retain, or for how long it would retain any potency afterwards. If that procedure were adopted it might be possible to reduce the total cost of production of the serum. He desired to stress one other thing: he thought that some cases which had been recorded as instances of breakdown of the vaccine-virus method of protection had had nothing whatever to do with distemper: cases, for instance, of *Bacillus bronchisepticus* infection, which were often exceedingly difficult to distinguish from distemper. He thought that, in cases of difficulty, the only way in which definite information on the point of correct interpretation could be made would be to send material to Dr. Laidlaw and Major Dunkin, so that it could be tested as to whether or not a true distemper infection was present.

He must join with other Fellows of the Society in thanking Dr. Laidlaw and Major Dunkin for giving them an account of that most valuable piece of work, for they, of course, were the people who were going to benefit by it, as well as their patients. (Applause.)

Professor J. G. Wright said that Dr. Laidlaw and Major Dunkin would appreciate, from the sentiments which had already been expressed, that they had the utmost confidence in research work emanating from Mill Hill. They regarded it as sound and something upon which they could rely.

The accusation usually levelled by the researcher at the clinician, was that the latter jumped to conclusions. This one did not wish to do, and so he would look at the data Dr. Laidlaw had given them.

Charts 1, 2 and 3 showed that, by using simultaneously a serum obtained from dogs immunised against what he (Professor Wright) was going to call the Mill Hill strain of distemper, and dose of Mill Hill virus, he was able to immunise puppies against subsequent large doses of virus. This simultaneous injection caused little or no reaction.

The first thing that impressed him was that this simultaneous injection gave an active immunity. Having no experience of immunological work, it appeared strange that, there being no reaction at all, an animal could obtain a solid active immunity. Dr. Laidlaw had told them that he had imposed an immunity which, so far, had lasted two months, and, moreover, he believed that immunity to be life-long. Chart 3 was the control puppy. What struck him most was the course the disease followed in this case. No mention was made of the animal's age, but it was spoken of as a puppy. It recovered from the experimental disease in 14 days. As clinicians, they found that puppies did not recover from street distemper in 14 days; in fact, in puppies under six months, 95 per cent. of them died. That might be due to complications, but it was distemper as it had to be combated.

The next point was that Dr. Laidlaw and other speakers had given evidence of the value of the serum as a curative in the treatment of naturally-occurring distemper. Here again, none of the ages had been mentioned. Dr. Laidlaw referred to the terrier, the Dandie and cross-bred Labrador, and showed that the serum could control the disease; subsequent inoculation of ferrets proved the disease to be distemper, but one must not lose sight of the fact that in adult dogs recovery from distemper was common, often without a serious illness, and so, to enable them to appreciate better the value of the serum in these cases, would Dr. Laidlaw give the ages of those animals?

Mr. Wilkinson observed that he would like to say, for Professor Wright's information, that none of the puppies he had inoculated had been over six months old; he had done them as soon as possible after three months. He was advised by Major Dunkin that three months was the earliest advisable age at which to immunise them.

Professor Wooldridge said that he was not sure that he was quite at one with Professor Wright in regard to the age incidence of distemper in the case of animals that had been kept in a compound and had never been exposed to any possible infection with distemper. He was of opinion that the immunity one saw in later years was the result of minor infection and lightly-acquired resistance, and that if those inoculations were carried out in dogs of any age and under circumstances where they had never been exposed to infection at all, then they would be equally susceptible.

The President observed that he thought that most of them who had had canine experience had met with second and third attacks of distemper.

Dr. A. L. Sheather commented that the point raised by the President indicated the possible intrusion of plurality of virus as a factor.

Mr. Eustace Montgomery, in response to the President's invitation to him to contribute to the discussion, said that he had nothing to say on the subject of distemper itself, but Dr. Laidlaw had referred to the virus plagues which in India and Africa were dominant, and no one could have listened that night without appreciating the amount of work that remained to be done upon them in those countries. The illuminating ideas Dr. Laidlaw had shed might, he thought, be seized upon with great advantage by veterinary workers in the colonies, for the improved production of anti-rinderpest serum particularly. He hoped that details of the work now recorded would be, at no distant time, available to them, and he already saw a great range of problems upon which the research workers at Mill Hill could collaborate with the workers on the various diseases of the Empire.

The vaccine virus method which the former introduced had been seized upon by the latter for adoption in dealing with rinderpest, East African swine fever, and also horse sickness, which last-named was a virus disease that Dr. O'Brien did not mention. The work now in progress in Kenya and West Africa indicated most striking results in the application of the Laidlaw-Dunkin vaccine-virus method to rinderpest.

Surely co-operation between the work going on in this country and that prosecuted abroad could not fail to be of the greatest benefit to all concerned, and was tangible evidence of the benefit to be derived from research in whatever country originating. (Applause.)

Dr. W. R. Wooldridge requested Dr. Laidlaw, in his reply, to give his own statistics. He was not trying to belittle the work in any way—it had impressed him as much as it had everyone else—but the most important feature in any work involving animal experiments was the statistics associated with it. For this reason he would like to have a summary of the vital statistics of animals that had been experimented upon by Dr. Laidlaw and Major Dunkin in their researches.

Mr. A. Cornish-Bowden observed that he had nothing to add to what had already been said, except to express his thanks to Dr. Laidlaw and Major Dunkin and to Major Dalling for the most instructive contributions they had given them that night.

Two or three things had occurred to him, as quite an ordinary practitioner. The first was as to the amount of serum that would be required to treat cases in the field; the amount that was obtainable from so small an animal as the dog, and the price they were likely to have to pay for that commodity when it was on the market. He could appreciate the fact that Professor Wooldridge, for instance, would need tanks and tanks full of it (laughter) and he was wondering what the product actually was going to cost.

Another thing that struck him very forcibly was the fact that the majority of clinicians—outside Mill Hill, the Wellcome Laboratories, and the Royal Veterinary College—might seldom have to deal with uncomplicated cases of distemper. He was not one of those who believed that true distemper occurred twice in the same dog, but there were so many diseases that closely simulated it that the ordinary person, like himself, found it exceedingly difficult to be certain with what he was dealing until it was too late for serum to be of any use unless one employed large quantities. With a dog worth only 50s. it was not going

to be an economic proposition to give repeated doses of serum.

The existence of complicated infections, quite apart from the pure virus disease, constituted one of their greatest difficulties as clinicians.

Captain L. S. Balls said that he would like to ask Dr. Laidlaw from what the subjects of the following two cases were really suffering: One was a Chow dog, six months old, inoculated with vaccine and virus six months ago. Last week it was taken with fits, of which it had twenty or thirty. These ceased, but his lungs became affected and he was now having oxygen given to him as his breathing was very laboured. The second dog, an Airedale, twelve months old, also had vaccine and virus six months ago. A month ago he developed a cold—he had a running discharge from the eyes, went off his food and had a high temperature, but in three days he was well again. A month from that time the dog broke out with a heavy discharge from the eyes and a copious discharge from the nose; to-day he was recovering and doing well. These animals were only inoculated with the vaccine and virus: from what were they suffering?

The Reply.

Dr. P. P. Laidlaw: Dr. Sheather wanted to know if it was possible to get immunity without symptoms and with a perfectly flat temperature all the way through. In one of the charts he had shown them, a dose of 5 c.c. serum prevented any symptoms from the virus and the temperature was almost a straight line. They took two more puppies from the compound and gave one 5 c.c. and the other 20 c.c. of serum, and both puppies got virus. Neither of these puppies showed any abnormality or temperature, and when tested one month later they seemed to be perfectly immune. Therefore, he thought they could, as Major Dalling had confirmed, give more serum than was required to give a flat temperature curve and still not interfere with the development of immunity.

They had not done much intravenous medication, but they had found that isolysins did exist among dogs and, therefore, there might be a small risk from this source. In the cases of transfusion of cattle mentioned by Dr. Sheather he thought that the fatalities were to be explained on these lines, *vis.* lysis of red cells, for it was now recognised that the red cells of oxen have remarkable individual specificity.

Regarding the point raised by Professor Wooldridge concerning sub-dural medication, he (Dr. Laidlaw) threw that out as a suggestion, because it would allow them to bring the antibody one step nearer the nerve cells.

As to whether they might get late nerve symptoms, he did not know; all he could say was that so far nothing of that kind had been reported to them, and concerning the possibility of a dog developing chorea some months later, although it showed no symptoms from serum and virus treatment, he would not say that it would not occur, but he would not expect it to do so.

The point about fully bleeding out the dogs was that once the maximum of the antibody curve was reached it was probably better to take the opportunity of getting all the serum that you could.

The cost of the serum was not a matter for his consideration at all, but he thought that it would ultimately work out cheaper than the vaccine. He believed the Cutter product cost 7s. 6d. per 10 c.c., but he was not quite certain of that.

He was very glad that Professor Wooldridge raised the point about cases which appeared to break down, *i.e.*, they really did want to be absolutely certain. They wanted proof. There was no doubt that in the past certain cases had been said to have broken down (following vaccine and virus) when, as a matter of fact, the illness was due, not to distemper, but to *Bacillus bronchisepticus* infection, or something of that kind. It really was extraordinarily difficult sometimes to be quite certain in the field whether a dog was suffering from genuine distemper or not. If suspected cases occurred they would be very glad to have material, so that they could try and settle the point by animal experimentation.

The question of strains of virus had come up again and he could only say that they had not yet found more than one strain of distemper virus: that statement was based upon several considerations; for instance, a dog or ferret immune from one strain seemed to be immune from all other strains, while a serum which would neutralise one strain appeared to neutralise all the others they had tried. On two occasions they proved that one dose of serum would protect against a mixture of three strains of virus given at the same time. As to the age of the puppies, they nearly always used puppies at between three and four months. The variation in the duration of the illness was a point which was very striking in experimental distemper: to what the variation met with was due, he did not know. Some cases seemed to recover much more rapidly than others; why, he could not state, though he had an idea that it was because the virulence of the strain varied from time to time. They had tried to exalt the virulence by dog passage, but after passage through four dogs the virulence had not gone up very much, and they abandoned the attempt as being too costly.

As to statistics concerning the number of dogs they had actually handled themselves, he was sorry, but he could not supply them. Many of their experiments were done with the idea of testing the value of the sera, and he supposed Dr. Wooldridge would exclude those and only make statistics from those which related to dogs which had been dosed with sera that one had reason to believe was good. If one reduced it to that, the total of all animals that they had done was not very large; he should put it at about 50.

As to what the dog with nerve symptoms which developed pneumonia was suffering from, he really did not know: that was another point in the evening at which he missed Major Dunkin very greatly. (Laughter.)

In conclusion he must thank them very sincerely for the extremely cordial reception they had given him that evening.

Professor Wooldridge said that he thought that Dr. Laidlaw had missed one of his questions, which was as to how long a dog was likely to be infective after the injection of the serum and virus.

Dr. Laidlaw replied that he did not try to turn away from the question (laughter), but he really did not know. He agreed the point should be tested by experiment.

The Agriculture Estimates.

The total sum of £2,310,152 which the House of Commons will shortly be asked to vote for the conduct of the Ministry of Agriculture and Fisheries during the coming 12 months, shows a reduction of £82,918 on the last estimate. A marked saving is made in the sum provided for compensation payable in outbreaks of disease. "Evidently," says the Agricultural Correspondent of *The Times*, "the Ministry's experts take an optimistic view of the country's immunity from foot-and-mouth disease now that a serum is being used to prevent the spread of infection from the original outbreak to neighbouring farms. From a perusal of this estimate there can be no mistaking the enthusiasm of the Minister for marketing reform. The Markets Division is to be allowed a staff of 124, instead of the present 63 and the dozen who sufficed a few years ago. Farmers would perhaps be better pleased in these days of stock farming if more ample provision had been made for the development of the Diseases of Animals Division, with increased grants to research institutes for work on foot-and-mouth disease, swine fever, tuberculosis, and the other scourges that cause heavy losses. The benefits offered by marketing reform on the lines now proposed are questionable, but there is no dispute about the need for a more active campaign against animal diseases."

Dog Distemper Antiserum.*

By G. W. Dunkin, M.R.C.V.S., D.V.H.
Superintendent, Medical Research Council Field Laboratories, Mill Hill.

Members of this Division are well acquainted with the vaccine-virus method of immunisation against distemper and many of them have had experience of this method in practice. The principles involved are based on the established fact that dead organisms, which when living give rise to certain pathological conditions, will, when killed and suitably treated, act as an efficient antigen to that disease. In dealing with a condition like dog distemper, the cause of which is an organism of the filterable type, difficulties are encountered which are not met with when bacterial diseases are being studied where it is possible to cultivate the organisms artificially. It is not possible, in the present state of our knowledge, to obtain artificial cultures of filterable viruses and the experimenter has therefore to make use of one or other of the animals susceptible as his culture media. The vaccine which is being used in the protection of dogs against distemper is not a vaccine in the true sense of the word since, in addition to containing dead organisms, it also contains animal tissue.

Reports to hand show that vaccine when injected into a susceptible puppy and followed at a certain time by living virus confers an immunity in the patient which is durable.

Since the publication of our results in November, 1928, we have turned our attention to the serological side of the investigation and it is about this that I wish to speak to-day.

The use of sera for the production of immunity in dogs against distemper is not new but, as is well known to the practitioner, the results which have attended their use have been disappointing. The reason for this is not far to seek, for most have been prepared by immunising some large animal, such as the horse, with bacteria or bacterial products. Examples of these are to be found in the Serum Gans, Serum Piorkowsky, Serum " D.W.," and sera from horses immunised against *B. bronchisepticus*. The various organisms mentioned have been chosen because they were regarded by the authors as the true infective agent of distemper, or because they were commonly encountered in cases of that disease.

In the light of our present knowledge of the etiology of dog distemper it cannot be expected that any of these heterologous sera will be of much value in either prevention or treatment of the condition as we would understand it. At the same time, it would be unfair to say that they have absolutely no value, for it is highly probable that for the treatment or prevention of specific infection caused by the organisms which have been used in the preparation of these sera they should be useful. The difficulty is, however, that the clinician is not able to differentiate between, say, a streptococcic infection and one set up by *B. bronchisepticus* and by the time he has been able to ascertain the exact nature of the infection several days would have elapsed.

In addition to these heterologous sera there are three homologous sera of more recent manufacture on the market at the present time, designed to antagonise the virus infection, or what is now generally regarded as the true disease. That which is perhaps best known to the profession in this country, and that by reason of the advertisements which have appeared from time to time in the veterinary press, is the serum prepared by the Cutter Laboratories in the United States of America. This product is made by hyperimmunising dogs but, as far as we have been able to ascertain, there is no exact description of the method of its manufacture nor any account of a method of standardisation. The recommended dose is 10 c.c. and this amount will, it is stated, confer a passive immunity on a susceptible dog lasting from 10 to 20 days; and a larger dose of 20 c.c. to 30 c.c. is said to be useful in treatment. The Cutter Laboratories have, of course, for many years manufactured and issued a heterologous serum prepared from horses which have been hyperimmunised against *B. bronchisepticus* and hæmolytic and non-hæmolytic streptococci.

A second homologous serum was described by Ashe Lockhart, Ray and Barbee in 1925, but once again we have no detailed information regarding the technique of its manufacture or of its standardisation. The authors make similar claims for this serum as is made by the manufacturers of the Cutter product. They add, however, that the serum combined with an antigen, the nature of which is not disclosed, gives a more durable immunity. Tested by Skidmore and Buckley in 1926, the results were not so satisfactory as those obtained by the originators of the method.

Finally, Nusshag and Stecher published in 1929 an account of an antidistemper serum prepared in dogs by hyperimmunising with virus and certain bacterial antigens, not specified. This is an attempt to combine specific treatments. Precise information as to the method employed in the hyperimmunising course is not forthcoming and the authors produce no evidence of standardisation except to say that 10 c.c. should protect a susceptible dog and larger doses, repeated if necessary, should prove valuable in the treatment of the disease.

It will be observed that 10 c.c. appears to be the standard dose of serum recommended by these three authors and we now regard this as a low standard, for we have experience of a convalescent serum which gave protection when similar doses were used.

It is evident, therefore, that certain workers believe that a hyperimmune serum is of value both in the prevention and also in the treatment of the disease, but unless the product is adequately and properly standardised the results must of necessity be variable and at times disappointing.

We have been busily engaged for the past two years in an investigation of the preparation and usefulness of hyperimmune sera prepared from dogs and the results which we have obtained are both encouraging and satisfactory. A hyperimmune serum of high potency is of value both as a prophylactic and also in treatment of acute, uncomplicated cases of the disease.

Prophylaxis.

Passive immunity can be produced by an injection of 5 c.c. of a good serum. The length of time which such

* Presidential Address to the Royal Counties Division, N.V.M.A., at Reading, on January 30th, 1931.

immunity would last was thought to be quite short, but we were somewhat surprised to find on test that it was not longer than nine days. I need hardly add that many experiments were conducted before we arrived at this conclusion and it must be remembered that when the period nine days is stated what is meant is that if a puppy is tested with virus at this time he may develop a diphasic temperature curve but practically no malaise. It is therefore conceivable that passive immunity conferred by one dose of a good serum may last longer than nine days if the patient is allowed complete freedom of movement and has to rely on natural source for infection to take place. Even this comparatively short time will be of some value in certain cases and will tide over a dangerous period when a dog is likely to come into contact with cases of the disease, such as competition at shows, and there is insufficient time to allow for the complete process to be carried out. Doubtless such a procedure will commend itself to veterinary surgeons who are anxious to protect a valuable patient which is in hospital.

Active and durable immunity can only be secured artificially by the use, at some time in the process, of living virus and by experiment we have found that 5 c.c. of a good serum given subcutaneously on one side of the body and a surely infecting dose of living virus on the other, given a few moments after the serum, will confer an immunity which we have reason to believe is active and lasting. In fact, the treatment is reminiscent of that which has been applied in hog cholera and rinderpest with such marked success. The technique to be observed is similar to that employed in the vaccine-virus method and with which most of you are acquainted. Strict aseptic and antiseptic precautions are essential for the success of the work. Immunity in such cases develops gradually and appears to be established in about three weeks after the injections have been given, after which time it is safe to allow the patient complete freedom of movement with other dogs whether infection be among them or not. A point of practical importance arises here as to what is the best procedure to adopt with regard to foxhounds. We can only say that in the majority of cases the hounds have been assembled for the treatment which has usually been carried out in one day in kennel with, as far as our information goes, no untoward results.

It is advisable, whenever possible, to arrange for bi-daily temperatures to be recorded, so that the operator may be able to decide if the inoculation has passed off satisfactorily. Occasions have arisen (they are rare) when an inoculated dog will show a pronounced temperature response at the third or fourth day and may be definitely "off colour." We believe such cases to be examples of unusual sensitiveness. Providing the state of affairs is recognised the matter is of no great consequence, for a double dose (10 c.c.) of serum given at once will curb the attack and the next day the temperature will be found to be normal and the patient seeking his food.

It will be seen from the above that the serum-virus method of immunising has at least two advantages over the vaccine virus technique: (1) only one visit for injections is necessary, and (2) an unlooked-for response to the virus can be checked and serious illness avoided.

Altogether, we have issued to veterinary surgeons and used ourselves about four hundred doses of serum for prophylaxis, and only about half-a-dozen dogs have required a second dose of serum. It is necessary to add that if success is to follow this procedure one of the first essentials is that the hyperimmune serum used must be of high potency and the virus must be living. In order to explain the points I have made I will pass round one or two charts which shew the result of using serum of indifferent quality and of good quality. Charts of dogs D.3 and D.4, with their control, indicate what may be expected when using the former. It will be seen that both the dogs which received serum gave a response, D.3 having a narrow escape. This animal developed, in addition to a definite temperature response, diarrhœa, and blood streaks were observed in the stools. The control developed acute distemper and died 14 days after injection. Charts of dogs 63 and 64 shew the result of using a highly potent serum in dosage of 5 c.c. and 2·5 c.c. There was no response in either case. The control dog—65—developed acute distemper, was ill for some days, but recovered.

So much for the immediate results of the simultaneous treatment, and it may be mentioned here that both dogs 63 and 64 were tested for immunity one month later with a large dose of virus, and, as will be seen from the extended charts, both proved to be immune.

In a few instances we have given virus both two and three days after serum and the effect of this treatment will be seen by a study of charts of dogs 24 and its control 25, and dogs 33 and 34 and their control 38. [*Charts exhibited.*]

We believe that these results are evidence in support of our assertion that protection can be achieved by giving serum of high potency in the incubation period. It will be recognised, however, that the greater the delay in giving serum the larger the dose of serum required.

Treatment.

The success or failure of the treatment of naturally-occurring cases of distemper will depend on three main factors: (1) the potency of the serum used, (2) the length of time the disease has been present, and (3) the presence of secondary bacterial invaders. For the purpose of treating acute, serious and advanced cases, we have prepared from hyperimmune serum of known high potency a product which I will call "concentrated antibody." The average potency of this product may be roughly five times that of the hyperimmune serum and it is probable that an even higher titre than this could be obtained.

The detailed description of the preparation of this product would consume too much time and for this reason it is not proposed to say anything about it, but those who are interested will find an exact description in the March number of the *Journal of Comparative Pathology and Therapeutics.*

The value of the concentrated antibody has been tested both in the laboratory and in the field, and we have both failures and successes to record. It is not possible to say with certainty what the cause of each failure is, but it is probable that several factors play a part, chief among which are: the dosage, the frequency of repeated doses if any, and the channel made use of, *i.e.*, the subcutaneous or intravenous route, always providing that the product is of high protective power.

Two examples will suffice to indicate the effect produced

on animals already infected and shewing definite clinical symptoms :—The first was a smooth-haired terrier of about three months of age. It was purchased at a London store on December 1st last, and taken home by the owner. The same evening the puppy had a fit, not a very serious one and only lasting about two minutes. It was dull for about two days but not otherwise abnormal. On the third or fourth day following purchase he had an attack of diarrhœa and was not feeding. On the morning of December 9th (eight days after purchase) he appeared much worse and was brought to us in the afternoon of that day. His temperature on arrival was 105·2° F.; he was clearly very ill, had a hot dry nose and injected membranes. A sample of blood was obtained and injected into a ferret, and immediately after 10 c.c. of the concentrated antibody was injected subcutaneously. The owner (a medical man) wished to nurse the puppy himself; he was taken home and we did not see him again. We were fortunate, however, in obtaining daily, and in some cases bi-daily, reports by telephone. The day after his visit to us the puppy was much brighter and was feeding. The diarrhœa was less and his temperature had fallen to 103·8° and 103·4°. The following day the temperature had fallen to 101° and 101·6° and improvement continued. Five days after his visit he had an attack of hysteria and one more two days later, but apart from these occurrences he made an uninterrupted recovery. The ferret receiving the blood developed typical distemper at the appropriate time and was eventually destroyed in the last stages of the disease.

The second case was that of a well-bred and very valuable Dandie Dinmont terrier eleven months of age. This case is similar to that of the terrier, but had certain differences. In this case it is possible to state with tolerable certainty the day on which infection occurred, owing to the care taken by the owner, to whom we are indebted for much valuable information. This animal attended two shows on November 5th and 6th. The owner, knowing the risk she was running, took the wise precaution of recording bi-daily temperatures as from the day following the second show. Five days after these records had been commenced the puppy's temperature, which had so far remained normal, rose to 104·2° and he was brought to us at once. On arrival he was seen to be dull and listless and there was a complete absence of the characteristic vivacity of this breed of dog. Diarrhœa was present and he was not feeding. A sample of blood was obtained, injected into a ferret, and immediately after 10 c.c. of concentrated antibody was injected subcutaneously. The batch used on this occasion was not the same as that used on the previous case. We were allowed to keep the puppy in hospital so that he could be under our own supervision. The day following the injection his temperature had fallen to 102·4° and 102·8° and, in view of the value of the puppy, a further dose of antibody was given. From that date an uninterrupted recovery took place and he was sent home on November 20th, ten days after admittance. A feature of interest in this case is that he had received in February and March (1930) three doses of commercial vaccine but no virus. The ferrret developed distemper and was destroyed in the late stages of the disease.

Th temperature charts of these two animals are produced for your information.

The above records show the immediate results of injecting concentrated antibody in acute severe cases, but we have others which have not been so pleasing. More recently, for example, we were asked to visit nine puppies in one private kennel, five of which were Irish Wolfhounds and four were Dachshunds. The owner stated that they were early cases, but on examination we formed the opinion that the disease had been in existence longer than the owner thought. One wolfhound, for example, was suffering from pneumonia and the remainder were very sick dogs. Shortage of concentrated antibody unfortunately prevented us from giving all the puppies this product and only the apparently more serious cases were so treated, the remainder receiving hyperimmune serum. The puppy which had pneumonia died a few days later and the remainder continued to be very ill. In the absence of improvement a further quantity of serum was despatched to the attending veterinary surgeon and sufficient was despatched to treat the four worst cases. This was all we had to spare at the time. Two of the puppies developed slight fits and diarrhœa was persistent. Eight or nine days after our visit all temperatures were round about normal and remained so for about a week and all puppies were much improved, but the condition of none of them could be described as satisfactory. At the time of writing it is not possible to say whether these puppies will recover or not.

On the whole, however, our results and those which we have received from veterinary surgeons indicate that the use of concentrated antibody is extremely valuable in treatment.

Limitations of the Treatment.—It will go without saying that the sooner treatment commences after infection the better the results will be. The amount given will also vary considerably, as will the frequency of dosage.

The presence of secondary infections will of necessity hamper treatment considerably and good results cannot be expected when they are present. If the exact nature of the specific organism present could be quickly established it is more than likely that one or other of the bacterial heterologous sera would be of value in these cases. Lastly, nerve complications. The relative isolation of the central nervous system makes it extremely unlikely that when once nervous symptoms have become firmly established serum treatment will be of much value. Intrathecal injections of sera in such cases has not been tried, but it is probable that this method of introducing serum is more likely to be of value in the nerve type than the more common subcutaneous method.

Discussion.

Major Dunkin (as President of the Division) having expressed a wish that a departure should be made from the usual practice of refraining from discussion of an Address from the Chair, as he was desirous of answering any questions on his paper that members might be desirous of putting to him,

Major A. C. Duncan opened the discussion by saying that, as one who was completely attached to the earlier methods of producing immunity, by means of vaccine-virus inoculation, he was wondering whether the newer method of serum treatment had completely superseded the other.

The President replied that, in regard to the substitution of methods, he feared he had omitted to say, in his address, what was definitely in his mind and also in the mind of

his colleague, that they retracted nothing of what they had already said about vaccine and virus. They still held that to be a sound method of producing a durable immunity in dogs, providing the products used were up to standard, but there were definite advantages with the serum and virus method over the other, *viz.*, that only one visit was necessary, and also that when, as sometimes happened, a dog gave a high response to the virus, that response could be dealt with quite satisfactorily by a further dose of serum: a double dose of serum would put the animal right.

Major Hamilton Kirk asked if it were possible for the general practitioner to obtain the serum yet, if it were urgently required.

Major Dunkin replied that the position was this: As Major Kirk, and other gentlemen present, knew, they never sold any product from Mill Hill; they gave it away, because they liked to have records in return. They only had a very small quantity of serum available, and that was at the disposal of any veterinary surgeon who cared to ask for it, provided it was not already booked.

Mr. G. P. Male said that he was sure they were all very grateful to their President, Major Dunkin, for coming to Reading and giving them that splendid address—in reality, anticipating thereby his address to be delivered to the Central Veterinary Society—and for thus giving them the first news of his latest discovery, which he was sure would be a tremendous help to them in dealing with distemper, especially, as Major Dunkin had said, in those animals which had taken the infection and where one wanted to prevent a bad outbreak. He supposed, however, that the virus which was used would still be open to the objection that it might become non-virulent unless great care was taken in using it at once, in the same way that the virus was in the vaccine-virus method?

Major Dunkin said that the question of the viability of the distemper virus was a most important one, as they had always held that durable immunity could not be conferred without its use. To-day they dried the virus, and in that way it would keep for several weeks.

Capt. H. B. Collet enquired if, when using the dried virus, one was to expect a rise of temperature about the second day. He referred to the use of virus under the former method.

Major Dunkin replied that that depended on several factors: (1) on the potency of the vaccine; (2) on the reliability of the virus, and (3) the sensitiveness of the dog. He thought that it did not matter from the point of view of immunity whether or not one got a temperature, providing one's virus was living at the time of injection.

Major R. C. Tennant desired to say that he had tried the new method just described by Major Dunkin: he inoculated ten couples of fox hounds, all out at walk. He did not know whether or not any of his hearers had any experience of doing that, but, if so, they would readily understand that it took him the whole day: he used a simultaneous inoculation of 5 c.c. serum and ·25 c.c. virus. That was done nearly a fortnight ago and not a single hound had reacted.

Those hounds were all going to kennels in three weeks' time. The new method was much simpler, and much less trouble, than giving the vaccine and then having to go fourteen days afterwards to administer the virus.

In 1904 the cattle population of this country was 64,000,000, of which approximately 44 per cent. were dairy cattle. Of this number about 17,500,000 were milk cows. If one cow in five was used for production of market milk, it would indicate that 3,500,000 cows were kept in market dairies. In 1929 the cattle population was 56,000,000. In this number there were about 20,000,000 milk cows, but to-day over 55 per cent. of the milk cows furnish milk for the fluid milk markets, which indicates that we now have three times as many cows in market dairies as there were in 1904.—*Hoard's Dairyman, U.S.A.*

The Veterinary Record.
April 4th, 1931.

Canine Distemper Antiserum.

It is very gratifying to be able to record the further advance made in the prophylaxis of dog distemper by Laidlaw and Dunkin, as reported in this issue of the *Veterinary Record* in the form of communications made by Dunkin at a meeting of the Royal Counties Veterinary Society at Reading and by Laidlaw at the Central Veterinary Society in London. We make no apology for reporting both addresses, for although they contain much in common, as is inevitable when two collaborators deal almost simultaneously with the same subject, yet there are important points in each which did not receive the same emphasis in the other.

When we recorded our appreciation of the former work of these investigators on the vaccine-virus method of immunisation against dog distemper we expressed the hope that they would persevere in an endeavour to produce an antiserum which might be useful not only in prophylaxis but also in treatment of affected animals. It is therefore with much gratification that we endorse the congratulation of those who were privileged to hear at first hand that Laidlaw and Dunkin had succeeded in this task. This discovery of an effective antiserum has brought with it a big advantage in the immunisation of dogs, for it is shown that a simultaneous serum-virus injection is available, with a saving of valuable time in the production of immunity and a reduction in the expense, since it involves only one operation instead of two at intervals of a week or thereabouts. By the former method great care was necessary to avoid possible infection during the immunisation process, but the antiserum affords almost immediate passive immunity and, if used alone, would almost with certainty safeguard any dog going to a show during a week following injection, or protect an animal brought into hospital. As the passive immunity is of short duration, about nine days, the serum injection would have to be repeated for hospital patients unless it was converted into active immunity by virus injection. This latter process, however, might be somewhat dangerous to other animals in the same ward, so that the serum alone is advisable in such cases, since it is not yet established how long the virus-injected dog may remain infective.

A most important announcement by the researchers is that antiserum will frequently prove effective if injected after infection. Thus a dog may be protected if injected on his return from a show where he may have been exposed to infection, but the sooner the better. Indeed, for such cases,

and for the treatment of early cases of the disease, a special "concentrated antibody" has been prepared in order to avoid the necessity for otherwise very large doses of the antiserum.

This piece of excellent work will be heartily welcomed by all practitioners and dog owners. As Dalling said, in the discussion reported elsewhere in this issue, "Laidlaw and Dunkin have certainly passed another milestone on the way to perfection in the prevention and treatment of canine distemper, and it is hoped that their findings can be successfully applied in the field."

From The Veterinarian,

March, 1831.

A Hint to Veterinary Medical Witnesses.

(*Extracted from one of Mr. Amos's Lectures on "Medical Jurisprudence," at the University of London.*)

I shall have occasion frequently, in the course of my lectures, to advert to the subject of the demeanour of medical witnesses. The hour will just allow of me, this evening, adverting to one piece of advice; which is, in the witness-box, to drop as much as possible the language which is known only to scientific men, and to adopt that which is in popular use. If you have occasion to speak of a person fainting, do not say, as I have heard it said, that you found the patient in a state of *syncope*; and you must not expect a court of justice to understand you if you talk of a person being *comatose*, or of the appearance of his stomach after death being *highly vascular*, or of your having discovered poisonous ingredients in his intestines by means of a *delicate* test. The judge and counsel are, generally, very shallow men of science, and it is a great advantage for them to raise a laugh at persons whom they would represent to be using hard names for common things. Veterinary surgeons are a great game for counsel; as I remember, in particular, a veterinary surgeon who, when cross-examined by Sergeant Vaughan, was so unfortunate as to make use of the term "suspensory ligament," which the sergeant interpreted "a hangman's noose."—*Medical Gazette.*

University of Liverpool, School of Veterinary Science.

Golding Prize in Veterinary Anatomy.

The Edgar Golding Prize in Veterinary Anatomy has been awarded by the Senate to Miss M. R. Ormerod.

The Senate has also decided this year to award a special prize of £5 to the following student who was placed "*proxime accessit*"—Mr. J. Edwardson.

Victoria Veterinary Benevolent Fund.

In our issue of March 21st (p. 320) we reported on the very considerable achievements of the Ladies' Committee associated with the North of England Division, N.V.M.A., in raising money for the Victoria Veterinary Benevolent Fund, and which, culminating in a bridge and whist drive, produced over £50 for the Fund. In this connection, we regret that mention was not made of the splendid individual work of the Chairman of the Ladies' Committee, Mrs. G. H. Taylor, who, by her single-handed efforts, collected the sum of £20 from her friends prior to the function.

Union of South Africa.

A Veterinary Bill.

Following upon the recent publication in the *Record* of Mr. H. H. Curson's contributions on the history of the Veterinary Profession in South Africa, wherein the efforts of veterinarians to raise their status by legislative enactment were detailed, it is interesting to note the recent drafting of a Bill to provide for the establishment of a Veterinary Board and for the registration of Veterinarians, and for other matters incidental thereto.

The proposals of this Bill are that there shall be set up a Veterinary Board, consisting of three veterinarians nominated by the Minister of Agriculture, and that this Board shall be entrusted with all matters concerning the registration and the professional conduct of registered veterinarians.

The Governor-General is empowered, after considering recommendations by the Veterinary Board, to prescribe the qualifications which shall entitle the holder to registration in the Union. No qualification will be admitted unless (1) it entitles the holder to practise in the country where the issuing institution is situate; (2) by the laws of the country so issuing, the holder of a degree in veterinary science granted by the University of Pretoria is qualified to practise in that country without any further examination for admission, and (3) the Veterinary Board is satisfied that this qualification indicates a standard of knowledge no lower than that required for the acquisition of the degree granted by the University of Pretoria.

A British subject who was born in the Union, or was domiciled there when he commenced his veterinary studies, and having proceeded therefrom in order to prosecute these studies, may be granted registration provided that the qualification which he obtained abroad was granted after examination, entitles the holder to practise in the country of issue and indicates a standard not inferior to that of the University of Pretoria.

Provision is made for the registration of present practitioners, both those registered under the Natal Ordinance and those who, being in the possession of a degree or diploma outside the Union, have been for not less than three months engaged in the practice of their profession.

The fee for registration is £10, but this sum is not payable if the applicant is an officer in the public service.

The Veterinary Board may grant a certificate to unqualified men who have been engaged for ten years in this occupation as their sole and principal means of livelihood.

. . . . .

Another recently-drafted Bill provides that slaughter of cattle for food shall be carried out only by the use of a mechanically-operated instrument.

Exemption until 1933 is accorded to the killing for consumption by Mohammedans and Jews, after which date the animals must be cast by a mechanical device at the time of slaughter. Mechanically-operated instruments must be used only by holders of licences, for which a fee is levied.

Eleventh International Veterinary Congress, London.

August, 1930.

(*Continued from page 344.*)

Veterinary Science in Relation to Public Health, with special reference to the Production and Distribution of Milk.

By Professor Dr. R. von Ostertag,
Ministerialrat im Württbg. Innenministerium, Stuttgart, Germany.

The main points discussed in a similar paper, but dealing with the production and distribution of meat, remain true in the case of milk. However, the author deals at some length with the questions pertaining to the production and the control over the distribution of milk.

As a food product, milk is probably more important from the public health point of view than meat, because it forms a staple food of a young human being, and because many adults, who abstain, from one reason or the other, from eating flesh are dependent on milk for the proteins in their dietary.

As the milk yield depends on good nutrition and normal state of health of the animal, the rôle of the veterinarian in the control of milk production becomes exceedingly important.

Foot-and-mouth disease is the cause of enormous loss to the dairy farmer. This is estimated by the author as ranging from Rm. 50 to Rm. 100 per cow. All forms of bovine tuberculosis, and especially tuberculous mastitis, are another source of loss to the dairying industry. In 1926, in Prussia, 63,864 dairy herds, containing 1,125,000 animals—11 per cent. of the total cattle herd of Prussia—submitted voluntarily to the scheme for combating tuberculosis. Out of this number, 27,000 animals, mostly cows, with " open " tuberculosis, were eliminated. According to Wiemann, tuberculous lesions were thus distributed :—

Open pulmonary tuberculosis	95·88%
Tuberculous mastitis	3·2%
Uterine tuberculosis	·73%
Intestinal tuberculosis	·09%

Apart from tuberculosis and foot-and-mouth disease, two other diseases are of importance, from the veterinary sanitary point of view, in the production of milk : bovine contagious abortion and streptococcic mastitis. In the majority of cases the milk yield diminishes considerably subsequent to abortion ; on the other hand, it was proved during recent years that aborting cows can secrete *B. abortus* with milk and transmit to human beings drinking raw milk the disease called " undulant fever," running its course like a mild attack of melitensis infection.

Streptococcic mastitis is very rife in many dairying countries, and its chief danger depends on the fact that in chronic untreated or badly treated cases the cows eventually become useless for the production of milk. An effective control and prevention of this disease is one of the tasks for the State Veterinary Service.

Veterinary regulations in all civilised countries also exclude from distribution the milk produced by animals suffering from diseases which are transmissible to man : anthrax, rabies, cow-pox, diseases caused by bacteria of the paratyphoid-enteritis group, and localised diseases of the udder.

The detection of milk possessing a peculiar colour, odour or appearance, as the results of feeding on unsuitable or fermenting feeding-stuffs, or produced by the administration of certain drugs is also a matter for veterinary sanitary control.

The provision of clean milk resulting from the proper construction of cowhouses, attention to cleaning the udder, careful removal of the milk from the cowhouse, straining, cooling, and maintaining the milk at a low temperature until the time of sale are all matters which come under this heading. The " slogan " of the dairy trade, " Sound milk can only be obtained from healthy cows," can only be fulfilled by official regulation of the veterinary control of milk. In England the Dairy Order of 1926 achieves this, and the Dairy Laws in Germany aim at the same result.

All dairies must be under veterinary control. Comprehensive general principles to be applied by the supervising veterinary surgeons and dairy owners should be drawn up, as is done in Denmark, and these should be such as to satisfy the demands of Public Health. At the same time the production side of the matter must be kept in mind ; hygiene is also a matter requiring constant attention in this connection. The state of health of milch cows, feeding, and administration of drugs must be under the control of the veterinary surgeon. Milk from cows affected with tuberculous mastitis or other forms of open tuberculosis is to be considered as a possible source of danger to human health. In Germany milk from cows suffering from streptococcic mastitis is not held to be prejudicial to the health of man, but when it contains pus it is unfit for sale. In the United States forms of mastitis occur which render the milk dangerous, and may cause epidemics among human beings who have drunk the milk in the raw state. Veterinary control of dairies is supplemented by laboratory control. This plays a part parallel to that performed in connection with the examination of meat and meat inspection. The laboratory work includes the determination of the bacterial content, to ascertain the freshness and degree of cleanness of milk, and to detect pathogenic organisms and cellular matter by bacteriological and histological examinations of milk sediments. The findings which result from these examinations furnish grounds for the clinical examination of the animals in the dairies and thus afford a check upon the efficiency of the dairy inspection.

H. F.

Milk Inspection.

By A. Gofton, F.R.C.V.S.,
Chief Veterinary Inspector, Edinburgh.

The report submits a general résumé of the development of milk legislation and of the existing milk laws in Great Britain. The control and prevention of animal disease is vested in the Ministry of Agriculture and is under the direction of State veterinary officers, but questions referring to animal disease in relation to human health are dealt with by the State Departments of Health, which do not employ a veterinary surgeon. There is no Government veterinary public health service, and the veterinary officer only enters the sphere of public health in the local administration of towns and country districts.

Milk legislation is not uniform. England and Scotland each have separate milk Acts. The Acts are administered by the local authorities under the central direction of the State Departments of Health, and there is considerable divergence in the local application of the law. The country districts have, generally speaking, taken a less serious view of their responsibilities than the towns and cities.

The field work of milk inspection is divisible into two parts. The first is concerned with dairy stock and the premises of producers. This is the sphere of the veterinary public health officer. The second part concerns distribution and sale, and devolves on the medical officer or sanitary officer. There is, thus, a species of dual control, and it is debatable whether the system is productive of the best results.

The Contagious Diseases of Animals Act of 1878 conferred powers of milk control on the predecessors of the present Ministry of Agriculture, but these powers were transferred in 1886 to the Local Government Board (now the Ministry of Health). It was not until 1899 that the veterinary surgeon was restored to a legally recognised place in general milk legislation, and then only in respect of "such disease of the udder of a cow as was certified by a veterinary surgeon to be tuberculous."

The present milk Acts applicable to England and Scotland were placed on the statute book in 1915 and 1914 respectively, but they remained inoperative till 1925. In 1922, an amending Act was passed which provided (*inter alia*) for the official grading of milk, and which became immediately operative.

The Milk and Dairies (Consolidation) Act, which is applicable to England and Wales, provides that a local authority may, and, if required by the Ministry of Health, shall, appoint veterinary officers for the purposes of the Act. Power is given to sample milk for bacteriological and other examinations. The sale of milk for human use is prohibited in the case of cows giving tuberculous milk, suffering from tuberculous emaciation, acute mastitis, and other diseases. Provision is made for sanitary supervision of the production and distribution of milk and in respect of the health of dairy workers.

Eight or nine counties in England and Wales have appointed whole-time veterinary officers in terms of the Act, and, in a number of counties, a panel of practising veterinary surgeons has been formed, the veterinary surgeons acting as part-time officers. There are, nevertheless, intensive dairying districts in which no systematic inspections of dairy stock are carried out, and action is only undertaken on the initiative of the towns in respect of samples of milk found, on delivery, to be injurious to human health.

The Milk and Dairies (Scotland) Act provides, like the English Act, for the appointment of veterinary officers. With one or two unimportant exceptions, whole-time or part-time veterinary officers have been appointed by every local authority in Scotland. As a result, the minimum requirement of the Act, that the cattle in dairies shall be inspected once at least in each year, is being carried out, and, in many cases, much more frequent inspections are made.

The Tuberculosis Order is complementary to the Milk Acts, and, subject to compensation, gives power to slaughter cows giving tuberculous milk or affected with tuberculosis of the udder, bovines suffering from tuberculous emaciation or advanced clinical tuberculosis. The Order is primarily a public health measure and is not intended as a means of controlling bovine tuberculosis. In 1928, 16,967 cattle were slaughtered under the Order, of which at least 2,632 were known to be milk and udder cases.

During recent years, several serious milk-borne outbreaks of human illness due to *B. enteritidis* (Gærtner) have occurred in association with acute mastitis and retained placenta in cows. The available evidence does not show that the *Br. abortus* is a significant factor in relation to human health (undulant fever) in Great Britain, but this question is at present the subject of investigation.

The milk Acts are leading to an extensive survey of dairy premises and to progress in raising the standard of housing for dairy stock. In combination with clean milk competitions and other voluntary influences, they have also been productive of improvements in the hygienic collection and distribution of milk.

The official grading of milk is partial only in its application. It is governed by a Milk (Special Designations) Order. Four grades of milk are recognised, namely, "Certified," "Grade A (Tuberculin Tested)," "Grade A," and "Pasteurised." The first two are the produce of tubercle-free cows. Pasteurised milk must be held at 145-150° F. for 30 minutes. During the last ten years retarders have almost entirely displaced plant for "flash" pasteurisation. From 45 per cent. to 90 per cent. of the total daily supplies of certain representative cities is pasteurised. Much pasteurised milk is sold by non-licensed pasteurisers, without any indication that it has been treated by heat.

Experience in Edinburgh shows that licensed producers find no serious difficulty in maintaining the fat standard of 3·5 per cent. required in Scotland for "Certified," "Grade A (T.T.)" and "Grade A" milks. Similarly with the bacterial standards, most samples are found to be very well below the maximum permitted. The most common failure is in respect of the coliform test.

The question of the eradication of bovine tuberculosis has been much discussed, but progress in the establishment of tubercle-free herds has been very slow. In 1929, there were only 447 licensed tubercle-free herds in Great Britain. There were, however, an unknown number of non-licensed tubercle-free herds belonging to the breeders of pedigree stock and to public bodies which maintained tubercle-free herds for the supply of milk to institutions which they administered. The slow progress was attributable in a large measure to lack of public support of the movement.

Veterinary Science and Milk Hygiene.

By Professor C. F. van Oijen,

Faculteit der Veeartsenijkunde, Rijkisuniversitat te Utrecht, Utrecht.

The collaboration of veterinary surgeons in the practice of milk hygiene can be divided into two main parts. The first may be called specifically veterinary, and includes the study and combating of various diseases which can be transmitted to man by milk (*viz.*, tuberculosis, undulant fever, paratyphoid fever), or can make the milk unfit for human consumption (mastitis, etc.),

The second part includes the advancement of the production of first-grade milk, the study of the technical problems concerning the handling of milk, and practical milk-control. There are experts in other branches able to tackle these problems, but the veterinarian is at an advantage for this work.

Until the last few years very little attention has been paid to the bacteriological condition of milk. At a few specially-equipped farms certain bacteriological tests were in use, but with the bulk of the milk no attention was paid to the number of bacteria per c.c. or to the more harmful species which it might contain.

Food-controllers were aware that, as a rule, the milk in the street contained very high numbers of bacteria and that in summer such milk might be noxious for the consumer. The high death rate among young children in summer was in some way connected with milk, but clear knowledge was lacking of the special agent responsible.

In many cases death was due to derangement of the intestinal system, but although the cause of the illness was ascribed to the milk, the relation was in some cases very difficult to understand, because disturbances might be produced both by raw and by heated milk. Naturally, many species of bacteria, *e.g.*, streptococci, *B. proteus* and *B. coli*, were indicated as the specific cause for these troubles.

Dr. B. P. J. Plantenga, at the Hague, contributed a good deal to the better knowledge of these problems and in particular to our understanding as to the rôle of *B. coli*. Dr. Plantenga proved that *B. coli* produces under certain conditions a heat-resistant toxin, which may produce fatal results when injected into calves and laboratory animals. Clinical observation and experimental work led to the theory that *B. coli* toxin in the food will disturb the normal function of the small intestine and causes an alteration in the bacteriological flora of this organ, in particular, proliferation of *B. coli* from the food. Fresh quantities of toxin are produced in this way, which lead to a breakdown in the normal resistance of the host against this micro-organism and the result may be bacteriæmia and other complications such as pyelitis, etc.

This work proves once more the good results of collaboration between medical men and veterinary surgeons, but the experiments cannot be dealt with at length. I should like, however, to mention the following points:—

(1) Different strains of *B. coli* may vary in the amount of toxin produced, though all strains are able to yield some.

(2) This toxin, classified by Plantenga as "aggressin," being heat resistant, is not destroyed by boiling or pasteurising temperatures.

(3) Multiplication of *B. coli* in the milk produces toxins which are still present in an active state after pasteurisation. In such cases pasteurised milk may be able in certain circumstances to produce illness in children.

(4) The results mentioned above for *B. coli* may be true for other kinds of bacteria also.

Students of milk hygiene may conclude from these observations that it is no longer possible to neglect the bacteriological flora of milk, and that milk should be produced and handled in such a way that multiplication of bacteria does not occur. In this respect a high bacterial count in milk is to be considered as indicating that such milk has not been properly handled.

Before considering ways and means to improve this state of affairs, I should like to deal with the effect of the initial number of bacteria in the milk on the result of pasteurisation. With an increasing number of bacteria before pasteurisation, a higher proportion of heat-resistant individuals will be present. Fresh milk, which can be pasteurised satisfactorily by heating for half-an-hour at 63° C. will give unsatisfactory results if it is allowed to stand for some hours under such conditions that the bacteria can proliferate on a large scale. In this case large numbers of bacteria may be found in pasteurised milk, which is in consequence of poor quality.

It may be concluded that large numbers of bacteria, including *B. coli*, in milk should be avoided, because even pasteurisation is not an efficient method for destroying the unfavourable properties of such milk. Milk should be produced under such conditions that no proliferation of bacteria is possible. In this respect the task of the veterinarian is twofold. Firstly, he can indicate to the farmer and to the dairyman means which are simple and efficient under normal farm conditions, by which multiplication of bacteria can be avoided. Secondly, he is in a position to recommend rapid and efficient methods of controlling the number of bacteria in milk and for the detection of undesirable types.

Veterinarians must teach the farmers the details of how to produce clean milk.

What are the conditions which assist or prevent the proliferation of bacteria in ordinary milk? A systematic research in my laboratory, carried out by Treffers, showed once again the value of the "antibacterial power" in milk. In fresh milk drawn into sterile containers there can be observed a very distinct diminution in the number of bacteria during the first hours after milking. The intensity of the phenomenon depends on different conditions, but the temperature is of the greatest influence. At very low temperature the "antibacterial power" may be lacking, but at 25-35° C. the number of bacteria is reduced within two or three hours. In any case there is no augmentation of the number of bacteria during the first 72 hours when the milk is cooled below 10° C.

Treffers obtained the following figures regarding this question:—

At 28-30° C. proliferation begins after ± 6 hours.
,, 18-20° C. ,, ,, ,, ± 12 ,,
,, 15° C. ,, ,, ,, ± 24 ,,
,, 7° C. ,, ,, ,, ± more than 72 hours.

Milk cooled below 10° C. can be transported practically everywhere without any increase in the number of bacteria.

Even under tropical conditions (28° C.) such milk may be kept or transported for several hours without showing an increase in the number of bacteria.

In temperate countries cooling to about 14° C. can be done very easily on any farm on which artesian water is available, but for the cooling below 10° C. a refrigerator of some kind is necessary. The technical perfection which has now been reached by automatic refrigerators is in favour of their use on farms, but as stated previously, it is not necessary to cool to this temperature immediately after milking. There is ample time to transport the milk to a delivery station in the neighbourhood, where the cooling can be done on a wholesale scale and the cost per gallon reduced to a trifling figure. Milk cooled to about

6° C. is in excellent condition for railway or motor transport, even over long distances.

. . . . . .

I now come to the second part of this paper. In the first place, I wish to confine myself to a brief summary of the methods for estimating the numbers of bacteria in milk and for the detection of undesirable bacteria, such as *B. coli*.

Many tests for the detection of *B. coli* in milk have been known for a long time; one simple method is the fermentation test, as used in milk factories. In this, use is made of the ability of *B. coli* to split lactose to lactic-acid with production of gas. The ability to ferment lactose is made the basis of nearly every test used for detecting *coli*, down to the more modern methods described by Klimmer, Haupt and Borchers in the journal *Milchwirtschaftliche Forschungen*, 1929. These authors point out that the fermentative ability of *B. coli* in regard to lactose is fundamental and constant, and should always be considered in the first place, when devising methods for the diagnosis of *B. coli*. At times *B. lactis ærogenes* may be confounded with *B. coli*, but from a practical point of view the distinction is of little importance.

I should like to mention the following media, which are used in Holland, some of them on a wholesale scale :—

1. Acid-broth method.
2. Pegallac method.
3. Sodium taurocholate method.

1. *Acid-broth Method.*—Five c.c. milk is added to 50 c.c. broth, the reaction of which has not been adjusted, and incubated for 24 hours at a temperature of 35° C. It is assumed that *B. coli* grows in this medium whilst the development of other bacteria which may be present is checked. The culture is then plated on a special selective medium, usually endoagar, in order to detect red colonies resembling those of *B. coli*. Such red colonies must be tested in order to determine whether they are *B. coli* or not. For pasteurised or sterilised milk this method may be useful; for fresh milk there are some disadvantages, because the colonies of many other bacteria derived from fresh milk will show a red colour on the endoplates. In consequence, this method involves much labour and it is impossible to use it in daily routine work.

2. *Pegallac Method.*—The medium used consists of 5 gm. pepton, 5 gm. lactose and 30 gm. sterilised ox bile, added to one litre of water. After sterilisation and filtration, 2·5 per cent. of a concentrated solution of litmus is added. The bile prevents the growth of other micro-organisms and stimulates *B. coli*. Moreover, the medium has a buffer effect; acid, produced by fermentation of the lactose, is neutralised, production of gas is shown by means of a small inverted glass tube in the medium, and finally, the red colour of the litmus shows the production of lactic-acid.

It is usual to put up a series of tubes with falling quantities of milk, *e.g.*, 1·0 c.c., 0·1 c.c., 0·01 c.c., 0·001 c.c., and in this way the number of *B. coli* present per c.c. can be estimated.

3. *Sodium Taurocholate Medium.*—Five c.c. of a filtered solution of 1 per cent. sodium taurocholate in tap-water, stained deep blue with litmus, is placed in a sterile test tube, which contains a small inverted glass tube. Sterilisation expels the acid from the small tube, which is then filled with the medium. A quantity of milk, *e.g.*, 0·5 c.c. or 1·0 c.c., is added and mixed by gentle shaking, after which incubation follows for two days at 37° C. If the solution remains blue *B. coli* is not present, whereas the production of gas is an indication of the presence of this organism. If the liquid is decolourised or reddened without gas production, the result is doubtful. The culture may then be plated out and the resulting growth examined for *B. coli*. If very small quantities of milk only are used (0·01 c.c. or 0·001 c.c.) some lactose should be added to the medium.

The advantage of the last two methods is that in most cases the result is known in one or two days. Both are fairly accurate and can be used in routine examination of milk samples. In spite of this, a comparative study of the different methods for the detection of *B. coli* should be very useful, especially with reference to practical milk control.

There remain to be considered, lastly, the different methods for estimating the number of bacteria in milk.

In this paper our real purpose is to show that, owing to the very small number of bacteria per c.c., such milk has been produced and handled in a correct way so that no increase of bacteria occurred. As we know already that just after milking the milk contains only a few thousand bacteria per c.c. we can only use such methods as show clearly the difference between milk with 1,000, 2,000, 3,000, etc., bacteria per c.c. Moreover, the result must be known in a short time to detect faults in the farm routine. Many classical methods of investigation are quite useless for our special purpose. Among these may be mentioned the reductase test. Milk with a "reductase-time" of more than six hours may contain some hundred thousands of bacteria and it is impossible by this method to show any difference between milk with 1,000, 10,000 or 20,000 bacteria per c.c. The same may be said for the microscopical methods, devised by Skar and by Breed. Results obtained by such means are only accurate if the milk contains some hundred thousands or millions of bacteria per c.c. Therefore, such methods cannot be employed for the present purpose. There remain the classical method devised by Koch and the "little plate method" of Frost. The former may yield excellent results, but the plates have to be incubated for seven days at a temperature of 22° C. The so-called "Standard method" (incubation for two days at 37° C.) gives very unsatisfactory results, as the high temperature prevents many germs developing into colonies. Counts obtained in this way are only approximative and useless for our purpose. The necessity for incubating plates for a whole week makes this method very troublesome and it is hardly possible to use such methods for daily routine work. Besides, one cannot recollect after a week what particular circumstances may have induced the abnormally high figure occasionally found. Although the qualitative bacteriological test is acknowledged to be the only suitable method for testing the cleanliness of milk, there was until recently no method which reached practical requirements, *viz.*, a high degree of accuracy and quick reading of results.

These requirements are attained in the "small plate method" of Frost. I have had this method tested on a large scale in my laboratory, and have given reports of

our experience before different meetings. The author gives a description of Frost's "small plate method." On a sterile slide, on which are marked two rectangles, each measuring 5 sq. cm., there is placed on each rectangle a mixture of 1/20 c.c. of milk and 1/20 c.c. of liquid agar, the slide at the time lying on a table heated to 45° C. The mixture, which should not solidify too quickly, is spread evenly over the rectangle with a platinum loop, so that every square mm. contains 0·0001 c.c. of milk. In this way every colony growing per square mm is indicative of 10,000 bacteria per c.c. milk. After cooling the agar under a glass bell the slide is put in a specially devised damp incubator for 16 hours at a temperature of 28° C. The preparation is then fixed by drying for a few minutes at 95° C., and is subsequently stained with carbol thionin and finally washed in slowly running water. After drying, the number of colonies may be counted. To this end the slide is placed under the microscope and the preparation is enclosed by a cover glass, which is provided on its lower surface with a scale showing square mm. The colonies in a number of fields of one square mm. each, regularly distributed over the whole preparation, are now counted. After calculating the average number per field and multiplying by 10,000, the result shows the number of bacteria per c.c.

The advantage of this method is that when important differences in the number of bacteria are met with, one can apply next day to the manager of the farm to know where the fault lies. It is then often possible to trace irregularities in the handling of the milk. This quick working method is a greater impetus to the farmers to be on their guard than an inspection which reports its results more than a week after the test.

The report concludes with seven references to the literature.

H. L. T.

On the Percentage of *B. abortus* in the Milk of Cows that have Aborted in consequence of Infection with *B. abortus* Bang.

By Professor Sven Wall, D.V.M.

Director of the State Veterinary Bacteriological Institute, Stockholm.

It is generally known that *B. abortus* Bang is often present in the milk obtained from cows infected with the bacillus in question. It is also generally known that *B. abortus* can stubbornly and persistently be present in the milk from such cows.

The paper is an attempt to find out if the milk of such cows can be considered to follow any definite rule and if it is possible to calculate the percentage of bacilli present at any given time.

Cows and heifers were investigated which had aborted and in whose secundines the microscope showed *B. abortus* to be present. Sixty animals were dealt with on 37 different farms, and equal quantities of milk were taken from each teat from which milk could be drawn in the case of every cow under investigation. The material used was the cream obtained from this milk, which was inoculated into guinea-pigs, two being used for each milk. Two c.c. were utilised, one for each guinea-pig. One guinea-pig of each pair was killed after four weeks and the other after six weeks, in each case by an incision into the jugular vein, the blood being tested by submission to the agglutination test. The antigen was obtained from a special agglutinative *B. abortus* culture, the serum doses being 0·10, 0·07, 0·05, 0·03, 0·02, 0·01, 0·005, 0·002 and 0·001 c.c. The agglutination values employed in reading off the results are given in tabular form.

Period of Investigation.—Milk samples were taken from cattle which had aborted, from one to 20 weeks after the day of abortion.

Experience shows that both the cream and the milk sediment contain more bacilli than the remainder of the milk, and a table is given showing that, out of 20 cases, in only one were the agglutination values equal in the cream and the sediment; in 13 instances they were higher in the cream, while in six the values were higher in the milk sediment than in the cream.

In experiments carried out by H. Hedstrom in Stockholm, it was found that if the blood of a guinea-pig was examined four weeks after inoculation, the agglutination value of the animal's blood constitutes a measure of the number of bacilli in the material used. Agglutination values of 50 or less, indicate a smaller number of bacilli in the material inoculated, corresponding to about 10 bacilli per c.c.; while agglutination values of 100 or above indicate a larger number of bacilli corresponding to 1,000 bacilli or more, per c.c. The author is of opinion that the rule would seem to be that cream is richer in bacilli than is the sediment and that an examination of the cream is indicative of the number actually present in the milk.

As the injection of one c.c. of cream into the guinea-pig, according to the author, "seemed to cause the animal a certain amount of discomfort" the effect of injecting ½ c.c. of cream only was compared. The observation seemed to show that one c.c. of cream is too much, the abortus bacilli, if they be but few in number, being more or less mechanically prevented from infecting the animal, so that the infection is either delayed or altogether inhibited. Moreover, it was found that out of 32 guinea-pigs inoculated with one c.c. of cream, no less than ten died within a month, whereas out of a similar number inoculated with ½ c.c. only three succumbed within the same period. The effect of inoculating 1/10 c.c. was also tried but it was not found to be satisfactory as the ½ c.c.

A long and detailed table is given by the author, showing the result of the investigation of milk samples obtained from 60 cows. The milk was obtained after varying intervals following the act of abortion in regard to the percentage of abortion bacilli present in the milk.

The author concludes with the following summary of his work:—

(1) Cows which have aborted frequently excrete abortion bacilli in their milk.

(2) Infection, as a rule, appears as early as the first week after the abortion.

(3) During the first month the milk infection ought to be considered as an autogenous infection from the infected uterus.

(4) The autogenous milk infection may be long or short, the latter being somewhat the more common.

(5) When the infective period is short, the organisms usually disappear within two to six weeks, in most instances within three or four.

(6) Milk infection without causal connection with an abortion, but due to the *B. abortus*, frequently appears from six weeks to five months after the abortion. These should be considered to be due to the surroundings. They are about equally of long and short duration.

(7) Only a few cows which abort escape having their milk contaminated with the bacilli.

(8) As a rule, the bacilli are not present in large numbers in a milk infection.

The author then summarises the following points in regard to milk hygiene :—

(1) As cows which have aborted so frequently excrete the bacilli in their milk, the author thinks that we may surmise that infected cows, which have not actually aborted, however, but calve normally, also excrete the organisms in their milk. Such cows are quite as numerous as those which actually abort.

(2) As new infections in which cows abort are commonly attended by an excretion of the organisms in their milk. we may also conclude that they are not restricted to cows which abort, but are spread throughout the herd.

(3) If the above circumstances are correct, we may assume that in a herd that is infected with the disease, individual cows that have never aborted may excrete the organisms in their milk.

(4) In such herds, where any restrictions are made, or precautions are taken, they should not only apply to individual cows, but to the whole herd.

D. S. R.

Progress of Bovine Tuberculosis Campaign in U.S.A.

Since initiating the co-operative campaign to eradicate bovine tuberculosis in 1917, State and Federal agencies have located and slaughtered more than two-thirds of all the infected cattle in the country.

During this period veterinarians engaged in this work have tested and retested more than 75,000,000 cattle. Of these animals, they found approximately 2,000,000 cattle infected with the disease, and all of these have been slaughtered. The consistent efforts of Federal, State, and county veterinarians have reduced the infection of cattle from 4 per cent. in 1922 to 1·7 per cent. on January 1st, 1931. There are now fewer than 1,000,000 tuberculous cattle in the United States.

It is hoped soon to add Ohio, Indiana, and Idaho to North Carolina, Maine, and Michigan as modified accredited areas. The Federal Government is now spending about $5,000,000 a year for the eradication of bovine tuberculosis, and the States are spending approximately $9,500,000.—*Veterinary Medicine.*

Clinical and Case Reports.

An Interesting Foreign Body.

By R. Machin, M.R.C.V.S., Royal Veterinary College, London.

On March 4th a 12-weeks-old Great Dane puppy was brought to the Hospital on account of his owner being unable to find a metal meat skewer, seven inches in length, which had last been seen attached to some tripe which the pup had eaten four days previously.

Upon enquiry it was ascertained that the pup was apparently normal, having a huge appetite—no vomiting and bowels normal. His temperature was, however, 103·5° F.

Upon careful examination a slight pointed protusion could be seen moving up and down between the ninth and tenth ribs as the pup breathed.

The animal having been suitably anæsthetised, an incision was made through the skin and underlying structures directly on to this small protrusion, which proved to be the pointed end of the missing skewer.

The end having been grasped with forceps, extraction proved easy until the rounded end of the skewer, which was still in the stomach, presented an obstruction. Here the initial incision was enlarged and, upon pulling up the skewer, the diaphragm came into view. This was incised also and the stomach wall was next presented: here an incision ¾-in. in length was necessary in order to release the skewer.

Immediately both stomach and diaphragm receded to their normal position, rendering suturing impossible. Two sutures, however, were placed in the skin in order to cover up the wound, which was allowing free access of air directly into the pleural cavity. The operation has, apparently, had no effect whatever on the pup, who is in the best of spirits a week after the extraction.

The accompanying photograph, taken by Mr. P. W. Southern, of the Royal Veterinary College, two days afterwards, gives some idea of the relative size of skewer and pup and also shows the site of extraction.

A Preliminary Note on Orthodontia by Ligature in the Dog.

By J. F. D. Tutt, M.R.C.V.S., Winchester.

The following simple procedure is recommended in cases of lower protrusion of the incisor teeth in the dog.

It must be pointed out that the method is only applicable before the teeth are "set," and that it is probably not of much use after this has taken place.

For the purpose of illustration, it is assumed that the three incisor teeth on one side are protruding, and it is desired to bring them back into line with the other three on the opposite side.

Pass ligature silk round the base of the canine tooth on the affected side, as low down as possible, cross the ligature, and thread the free ends round each side of the affected incisor and tie as tightly as possible in front of it, thus forcing it back. It may be found necessary to apply similar ligatures securing them round the other canine tooth on the opposite side, but this can easily be judged at the time, as when tension is applied by tying the incisor, it will be seen to move back distinctly. The best silk to use is No. 4 Japanese Grass Line Orthodontic ligature silk, which will tighten still further in the course of a few hours, through the action of the saliva. The teeth should be examined at intervals of three to four days, and ligatures removed or replaced as occasion demands. If there is any undue soreness of the gums, leave the ligatures off for 72 hours, and paint with tincture of iodine. A case will shortly be described where this has been done, and I hope accompanied by sketches, clearly showing the way the ligatures are applied.

In the case of receding of the upper incisors, a bridge must be made, and secured by dental cement, either on to the external incisors if they are normal, or failing them, on to the upper canines, a space being left between the bridge and the front of the affected incisors. These are then ligatured separately, pulled forward and tied round the bridge. In the case of the upper jaw, copper bronze orthodontic wire is perhaps better than silk, but silk has been used successfully. The bridge must be rounded, to avoid ligatures cutting through and becoming useless. During treatment, sloppy food must be given.

I hope that this short note will help others to rectify a condition, in valuable dogs, upon which they may be asked in advise and which procedure, owing to its simplicity and effectiveness, has much to recommend it.

The presence of contagious pleuro-pneumonia in the United States and the embargo placed upon American cattle by the British Government was chiefly responsible for the establishment of the Federal Bureau of Animal Industry by Act of Congress, May 29th, 1884. Six weeks later, the disease was discovered in Illinois, and in the following year in Missouri and Kentucky. The United States was officially declared free of the disease on September 26th, 1892. Its eradication cost the Federal Government $1,509,000.—*Veterinary Medicine.*

N.V.M.A. Divisional Reports.

Royal Counties Division.

Annual General Meeting at Reading.

At their Annual General Meeting, held at the Great Western Hotel, Reading, on Friday, January 30th, the members of this Division were privileged to hear their President (Major G. W. Dunkin) discourse for the first time on the investigation which Dr. Laidlaw and he have been carrying out for the past two years at Mill Hill concerning the preparation and usefulness of hyperimmune sera in the prophylaxis of distemper and also in the treatment of acute, uncomplicated cases of the disease. Had this important and refreshing departure from the customary form of Presidential Address been anticipated, doubtless a larger number would have journeyed to the Berkshire town despite the wretched weather prevailing on the day of the meeting.

In addition to the President there were present Messrs. J. R. Baxter, R. E. C. Bullen, Captain H. B. Collet, Mr. J. A. Craft, Major A. C. Duncan, Messrs. R. Gregg, E. J. Heather, Captain J. R. Hewer, Major H. Kirk, Captain W. L. Little, Messrs. G. P. Male, J. W. McIntosh, Lieut.-Colonel P. J. Simpson, Major F. J. Taylor, Major R. C. Tennant, Colonel G. K. Walker, Messrs. A. E. Ward, F. W. Willett, R. A. Willett and H. Bell, Hon. Secretary. Mr. G. W. Nimis was present as a visitor to the meeting, while, at the subsequent dinner, the company was augmented by a considerable number of friends of the members. The minutes of the previous Annual General Meeting, which had been published in the *Veterinary Record*, were taken as read and were confirmed and signed.

The next item on the agenda was the reading of the rules of the Division by the Secretary, if required, but no such demand was made and the President informed the members that, at a meeting of the Council of the Division held that afternoon a committee was appointed to consider them. Any recommendations made by that committee would be placed on the agenda of the next meeting, to be held in April.

Absentees.—The Secretary announced the receipt of apologies for absence from the following:—

Captain W. A. Austin, Messrs. A. J. Beeson, J. Bell, J. Carless, Major Robin Catmur, Messrs. T. G. Chamberlain, C. H. Ducksbury, C. Elphicke, Professor Hobday, Captain T. M. C. Hunt, Mr. C. P. Inglis, Major H. C. Jagger, Dr. P. P. Laidlaw, Mr. H. G. Lepper, Mr. T. W. Lepper, Major-General Sir John Moore, Lieut.-Colonel G. B. C. Rees-Mogg, Mr. H. L. Roberts, Major E. E. Seldon, Mr. S. Slocock, Lieut.-Colonel P. W. Dayer Smith, Captain Townson, Mr. F. T. Trewin, Captain S. Villar, Captain J. B. Walker, Major R. F. Wall, Mr. J. Willett, Captain E. C. Winter and Professor Wooldridge.

In this connection, Major Kirk informed the meeting that he had had a letter from Captain W. K. Townson, of Peterborough (a member) saying that he was unable to attend in consequence of an injury sustained in a hunting accident. Captain Townson had not spoken of it as serious, but from his description he (Major Kirk) feared that it was so.

The meeting decided to send a letter of sympathy, expressing the hope of the members for his speedy recovery, to Captain Townson, and also to Captain E. C. Winter, the reason for whose absence was indisposition.

In response to enquiries, the President said, amid applause, that he understood that their former Secretary, Major R. Catmur, was enjoying improved health.

Correspondence.—A letter was read from the Secretary of the National Horse Association of Great Britain, enclosing a copy of Major-General Sir John Moore's article "The Horse as an Economic Factor" (recently published in the *Veterinary Record*) and soliciting a renewal of the Division's subscription to the funds of the Association.

The recommendation of the Council that the subscription of £1 1s. be renewed, was approved.

Auditors' Report and Balance Sheet.—The Hon. Treasurer (Mr. G. P. Male) observed that Mr. J. Willett had written to him saying that he much regretted that he was unable to attend the meeting and give his usual report as Auditor. The members would see the balance sheet, however, on the last page of the agenda paper, and they would notice that the finances of the Society were in quite a satisfactory condition. The balance at bank amounted to £32 17s. 3d. and they had £25 on deposit, with investments of £50 in War Loan.

The President commented that he was sure all would agree that the balance sheet was indeed a satisfactory one, and he would like to move, from the chair, a vote of thanks both to the Hon. Treasurer and the Hon. Auditor.

The proposition was carried with acclamation and, on the proposition of Lieut.-Colonel Simpson, seconded by Captain Hewer, the report and balance sheet were received and adopted.

Resignation from Membership.—The Secretary brought before the meeting a letter of resignation received from Mr. T. G. Chamberlain, who was not now residing within the area of the Division. Mr. Chamberlain's resignation was accepted, with regret.

Mr. Male reminded the members that, at the last meeting, he had been requested to endeavour to secure a reconsideration by Captain W. A. Austin of the latter's decision to resign his membership, which they all deeply regretted. He was happy to inform them that Captain Austin would be very pleased to continue in membership. (Hear, hear.)

Election to Membership.—Mr. A. J. Baxter, of Lechlade, was unanimously elected a member, on the proposition of Mr. J. R. Baxter, seconded by the Hon. Secretary.

Royal Sanitary Institute Congress.—It was agreed to send a delegate to the Annual Congress of the body, to be held at Glasgow from July 4th-11th, and the President, or his nominee, was appointed; payment towards delegates' expenses of a sum not exceeding £5 5s. *plus* first-class railway fare, was approved.

Morbid Specimens, Exhibits, and Cases of Interest.

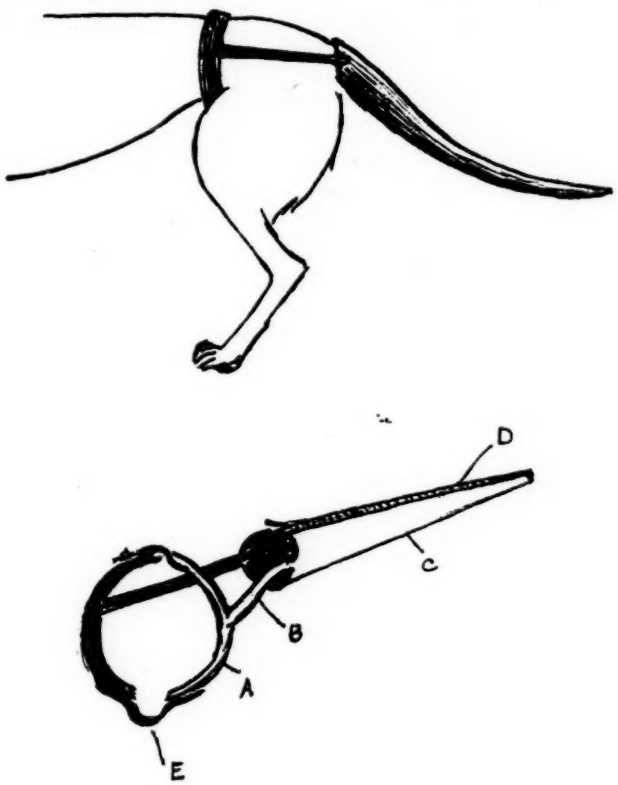
Mr. J. A. Craft said that he brought for their inspection some of the vertebræ of a hunter, which were of special interest to him because they were related to a case in which he was concerned in examining the subject—a horse which was bought at Tattersall's. He was subjected to some degree of insult by the prospective purchaser—a lady—in that, although he pointed out certain defects in the animal (which moved "woodenly" and was affected in its spine, also in wind and eyes) she checked him abruptly; therefore, he let her buy the horse without further ado. The lady hunted the animal for one season, but at the end of it the condition necessitated its destruction.

The bones showed a remarkable condition of erosion of the articular surfaces, extending practically the whole length of the spinal column. He thought that there was not a bone which did not show both erosions and deposits. It was a remarkable fact that, notwithstanding these extensive lesions and the circumstance that the lady rider was a real heavy-weight (16-18 stone), the horse put up a fine performance throughout the winter. When, however, he was turned out at the end of March he immediately showed intense anchylosis, not only of the bones of the neck but of the back. He moved rigidly, and could neither raise his head to feed from a hay rack nor lower it to pick food from the ground.

Major H. Kirk, said he was looking through copies of last year's *Veterinary Record*, in an early issue of which he came across a letter from a practitioner describing the removal of over a hundred cystic calculi from a dog. That writer looked upon the number as a record. He (Major Kirk) had brought for inspection 1,530 cystic calculi (the largest of which weighed 6¾ oz., and the whole collection weighing over ½ lb.) all of which were successfully removed from the bladder of an Airedale bitch about five months ago. The dog came in for operation one week-end at a time when the speaker's hospital nurse was away on leave and no help was available. As Professor Wright lived only a mile or two from him, this gentleman was approached and very kindly consented to go over, and he rendered very valuable aid in the operation. The number of calculi was far and away the highest ever removed from a dog, and the big stone was easily the largest known specimen. The bitch to-day was quite well in health, but Major Kirk thought there had already formed two or three more small stones in spite of the many precautions which had been adopted for their prevention. These included the giving of hexamine and lithium daily, boiled water, and a carefully selected diet. It seemed all of no avail, however.

Major Kirk thought the meeting would be interested to see a further modification of Gray's gag, the additional improvement being the provision of two curves on the top bar for reception of the first and second fingers, and a curve on the lower bar for the thumb. With the fingers and thumb in these selected positions there was perfect balance, and jambing of the movable bar was thus obviated. The particular instrument shown was a production of the Holborn Surgical Instrument Co. It was very well made and finished and sold at the exceptionally low figure of 8s. 6d. Major Kirk had also had a small replica of it made for cats, which was light in construction and quite efficient.

The speaker also showed his device for the protection of injured greyhounds' tails. With slight modification the device was, of course, equally



A.—Leather girth lined with chamois and fitted with a buckle.

B.—Leather side straps fitted with buckles.

C.—Light canvas tail protector.

D.—Zip fastener for same.

E.—Metal inset for accommodating the penis.

applicable for use upon any breed of dog. It was, however, the long-tailed dogs which gave such trouble when injury occurred, for by continually banging their tails against doors and walls, etc., they effectually prevented healing.

The device consisted of a tubular length of light canvas which opened out flat and was closed by means of a "zip" fastener. The tail was laid inside this canvas, and after surgical dressings had been applied, the canvas was closed. Two adjustable straps (one on either side) held the canvas to a leather waist band. The latter was padded all round; and inserted at its lowest point was a rubber-covered piece of light metal, so bent that the penis of male dogs could lie in it without being subjected to pressure when the girth was tightened.

Major Kirk then passed round a new tooth scaler for dogs, the advantage of which was the flat, roughened handle which superseded the thin spindle-like handles so commonly supplied. In practice, the latter type of scaler would often tend to turn in the hand, and also tire the hand unduly after some 20 to 30 minutes of its use. The new type would cost no more and was undoubtedly an advantage to the surgeon.

Finally, he exhibited a pair of forceps designed for giving pills to intractable cats and dogs. The forceps would grip any size of pill, and where one could not get one's hands near a bad-tempered animal's mouth, he had found that a pill could always be safely and surely administered with these forceps provided that a good grip of the scruff of the animals' neck was maintained by the left hand. The forceps were not intended for use on ordinary animals, but upon those veritable fiends which were sometimes encountered.

The President having invited discussion, Mr. G. P. Male enquired of Mr. Craft if he had made a *post-mortem* examination of the hunter and, if so, did he find any signs of tuberculosis in any of the organs. Further, was there any history of any injury to the spine from a fall, or anything of that sort, because there was a tremendous deposit on one of the bones he had seen.

Mr. Craft replied that he made a *post-mortem* and found all the internal organs prefectly healthy. The horse was in really good condition—particularly good for the end of the season. The reason for slaughter was that the animal had been turned out in terribly cold weather (he was not resopnsible for that, nor for the slaughtering) and immediately developed a terrible stiffness: it was so stiff that, as he had said, difficulties in feeding arose.

The animal had no fall while his client owned him, but he might have had prior to that, as he was 11 years of age. He (Mr. Craft) would like to have the opinion of members as to what was the cause of the condition: was it of a rheumatoid nature? He himself attributed it to that because of the intense stiffness that came on upon violent exposure.

Mr. F. Willett observed that in rheumatoid arthritis deposits formed very quickly. He presumed that Mr. Craft did not attribute the condition to tuberculosis?

Mr. Craft replied that the horse showed no sign of tuberculosis.

The President said that a similar case came under his indirect notice some few years ago, Mr. Trewin, of Watford, having requested him to see it. It was a case in which the animal was described as suffering from a stiff neck, accompanied by a certain amount of swelling on the near side of the lower cervical region. Mr. Trewin subjected the horse to the double intradermal tuberculin test, obtaining the tuberculin from him (here lay his connection with the case) and the horse gave a typical reaction. It was decided to kill the animal, and the bones were sent to him for microscopical examination. There was no difficulty in demonstrating the presence of tubercle bacilli, which were bovine in type. So far as he remembered from Mr. Trewin's report of the *post-mortem* examination, the horse showed no sign of tubercle anywhere else.

He submitted, therefore, that one could not say with certainty what was the cause of the condition revealed by Mr. Craft's specimens, but he thought it was probably one or other of the two mentioned, rheumatoid arthritis or tuberculosis: he frankly favoured the latter, although he had nothing to go upon except that one previous experience.

Major A. C. Duncan stated that it was a curious thing, if the condition were tuberculous in its origin, that so many people should, from time to time, have noticed something similar in horses without tuberculous lesions in other parts of the body. A client of his, having purchased a horse, brought it to him as a fit subject for admiration, this being a big, impressive looking animal, when he

(Major Duncan) noticed that the horse did not turn round very well. The client hunted him twice, and one day he fell down in trotting across a ploughed field. *Post-mortem* disclosed deposits on the neck and also anchylosis of the lower spinal bones. He did not associate that case with tuberculosis as there was no sign of it elsewhere than in the bones: if there were such an association, it was a remarkable thing that there was no sign of the glands being affected.

Major Duncan concluded by referring to the value of Major Kirk's device for protecting the tail of the dog during treatment: injuries to the tail had always proved extraordinarily difficult to heal in the absence hitherto of such a device, for which he predicted a tremendous "boom."

Captain H. B. Collet and Captain J. R. Hewer having instanced further cases of stiffness of the neck in horses, Major Kirk said that he would like the members present to consider the question as to whether or not there was any line of treatment which could be adopted in an endeavour to prevent recurrence in cases of calculus formation. As he had observed, he had reason to fear that the bitch from which he had taken the cystic calculi exhibited was now, after only nine months, forming several more small stones, and he had instructed the owner to try and keep them broken down by manipulation.

The President observed that Mrs. Dunkin had a Sealyham which developed cystic calculi just over two months ago. An operation for their removal was absolutely successful—as were the majority of such—eight stones, of a size almost to fill the bladder, being removed. That was rather less than three months ago, and now the dog's bladder was quite full of them again. In discussing this question with another veterinary surgeon recently the latter had told him that he used hexamine with what he considered to be quite satisfactory results in so far as three cases were concerned. He gathered that with two operations and subsequent treatment with hexamine, recurrence had not yet taken place over a period longer than that which elapsed between the two operations.

Major Kirk stated that the bitch, in his case, had been on hexamine ever since the first operation, nine months ago.

Mr. Male said that he did not know with certainty whether or not soft water would prevent the formation of those stones, but from his experience he thought that it would tend to do so. Some years ago he had a number of cases in a kennel of Pekingese, and made the suggestion that the dogs should be given soft water. Since the adoption of that suggestion only one case of cystic calculus had occurred in a number of years in that kennel.

He was once called, in consultation with another veterinary surgeon, to a case of urethral obstruction in a champion Aberdeen Angus bull. Urethrotomy was performed and the obstruction was removed. On learning that the owner had had several similar cases before that, he advised that these bulls should be put on soft water, as that being supplied to them was very hard indeed. There were no more cases of obstruction from calculi, as far as he knew.

Mr. E. J. Heather cited a case which he had had seven or eight weeks previously. A lady brought a dog to him suffering from incontinence of urine. He examined the urine and found little crystals of phosphate, a condition which, he was informed by a medical friend, was treated in the human subject by the administration of ordinary bicarbonate of soda. He accordingly adopted the treatment, and seven days later the quantity of phosphate in the urine was greatly diminished. The dog had sodii bicarb. every day for eight weeks: the crystals soon disappeared and there had been no recurrence.

Major J. J. Dunlop thought that Mr. Male's suggestion of placing the subjects of calculi on soft water was most valuable; indeed, it was extraordinarily important in all urinary troubles. Moreover, in the case of the horse, those animals did much better, as regarded their general condition, when put on to rain water entirely.

As regarded the use of hexamine, the view of a chemist of his acquaintance was that it was of no service if administered alone, but that good results would follow if hexamine were combined with an acid—he (Major Dunlop) thought oxalic acid.

Major Kirk said that following upon the operation he told the owner all those points in regard to prevention of recurrence which had been mentioned that afternoon: that the water should be boiled, meat withheld, etc., and he prescribed hexamine along with acid sodium phosphate. In subsequent conversation with Professor McCunn, however, he was told to take the dog off acid sodium phosphate.

Incidentally, it was curious that one did not hear more about stone in horses' bladders, in view of the fact that the urine of the horse contained a very high percentage of calcium salts.

The President: "You do see them, in old horses, at any rate."

Major Kirk observed that, in the treatment of calculus, German canine surgeons used an instrument which they passed down the urethra, crushing the stone, which then came away as gravel.

Lieut.-Colonel P. J. Simpson, commenting upon Major Kirk's instrument for administering pills to refractory cats, said that he got a very large number of cats and had never yet failed in the giving of pills to them by means of a little butter on the end of a penholder or probe.

Major Kirk replied that the instrument was not designed for use upon ordinary cats, but for those fiends which were sometimes encountered among felines and small mouthed, snappy dogs. In dealing with these, he thought the pill which was stuck to a buttered penholder would soon be on the floor.

Colonel Walker said that he had had to remove a considerable number of calculi and he had almost invariably found that the nucleus was a little blood clot, pointing to the possibility that small hæmorrhages in the bladder formed the nucleus of the stone. It would be interesting if Major Kirk would ascertain whether or not a blood clot formed the nucleus of the large calculus exhibited by him.

Captain H. B. Collet expressed the opinion that where, as in Major Kirk's case, there was such an enormous number of small calculi, in addition to the large one, it was extremely probable that some would be left in the bladder after the operation of suprapubic lithotomy, and that these would form the nuclei of the calculi responsible for the recurrence of the condition.

On the proposition of the President, a hearty vote of thanks was accorded those gentlemen who had brought forward *post-mortem* specimens and exhibits and who had recounted cases of interest.

Next Meeting.—The President informed the members that it was the unanimous recommendation of the Council that the next meeting of the Division (in April) should be held at the Army Veterinary School, Aldershot, if the suggestion met with the wishes of the authorities of the School.

Major Kirk proposed accordingly, describing the recommention as an excellent one, and observing that the School afforded abundant material for an interesting and instructive meeting. The proposition was carried with enthusiasm.

Any Other Business.

Dr. Bullock's Veterinary Works.—Lieut.-Colonel Simpson said that, with the President's permission, he desired to state that he had brought with him some copies of the second edition of Dr. Fred Bullock's "Handbook for Veterinary Surgeons," in the hope that some members who had not yet done so would purchase copies. All who had read the first edition would know of what great value to the veterinary surgeon was Dr. Bullock's book. Members of the profession should be more conversant than they were with their legal obligations, which were very clearly set forth, together with a great deal of other valuable information, in the "Handbook," which was published at the exceedingly reasonable price of 5s.

Major A. C. Duncan observed that he should like to endorse what Colonel Simpson had said, though he did not propose to buy one of the copies the latter had brought, as he had one with him. Dr. Bullock's "Handbook" was, in fact, the most valuable book he had got, and there was no work upon which he had expended 5s. which had given him anything approaching such a return in useful information. The "Handbook" was indispensable to every veterinary surgeon. (Hear, hear.)

Major Kirk reminded members of Dr. Bullock's earlier work "The Law Relating to Medical, Dental and Veterinary Practice," and gave the following instance of its value to the veterinary surgeon. Only last week, said Major Kirk, he was appearing in a court of law with another veterinary surgeon who was being sued for £150 on the ground of negligence. The defending solicitor was very pleased indeed when he (Major Kirk) produced the book for his reference as to what constituted professional negligence. Armed with the information therein contained, the solicitor brought the case to a successful issue.

Veterinary Advisory Officers.—The meeting went into Committee to consider the question of the appointment and duties of Veterinary Advisory Officers, brought forward by Mr. Craft.

Upon the resumption of open meeting, the following resolution was carried unanimously: "That this meeting views with apprehension the appointment of Veterinary Advisory Officers and is of the opinion that if these posts, and the multiplicity of duties at present carried out, are not greatly restricted, a great deal of harm will accrue to the veterinary profession and to the agricultural industry.

"This association supports the steps that have been taken by the National Veterinary Medical Association in this connection."

Captain Collet enquired if any member had had any experience of the use of Parke Davis' bovine hæmorrhagic septicæmia bacterin in the treatment of feline distemper, concerning which there was now a good deal of comment in *Fur and Feather*. He had used this product, but had not a very high opinion of its merits in this connection, and he had reason to believe that the producing firm themselves were rather surprised at the demand upon their bovine hæmorrhagic septicæmia bacterin for the treatment of cats. The demand came not so much from veterinary surgeons as from the lay public, as advised by *Fur and Feather*.

The Hon. Secretary said that he had used this product in the treatment of epizootic gastro-enteritis, but not in that of feline distemper.

Captain Collet stated that in *Fur and Feather* the condition was described as "Show Fever," and he put it down as feline distemper.

Major Kirk commented that the question was "What is Show Fever"? At shows cats contracted either catarrhal distemper or infectious enteritis. From information tendered by one of his clients, he believed that the use of Parke Davis' bovine hæmorrhagic septicæmia bovine bacterin prior to shows had been very efficacious, and he was going to test it right away.

President's Address.—The President (Major Dunkin), prior to reading the Address from the Chair which is published (together with the discussion which ensued) earlier in this issue, said that he must first of all thank the members for the honour they had conferred upon him in electing him President of that old and important Division, and assure them that he should leave no stone unturned to try and follow in the footsteps of his distinguished predecessors. There was one aspect in which he proposed to be somewhat revolutionary and to create what some of them might consider a precedent. He was not going to talk about the prospects of the profession, or of what had happened to it in the past, because he thought that most of them knew a good deal more about that than he did.

He had it in mind that that Division met only four times a year: one of those meetings was the summer meeting—given over, as it should be, to sheer solid enjoyment—and that only left three meetings for the discussion of the problems that vexed them in their daily life. Therefore, that day, instead of discussing veterinary politics or the general principles of veterinary surgery, harking back to the past or looking forward to the future, he proposed to talk to them for a while about some of their work at Mill Hill—some unpublished work which they had done during the past two years.

The President now read his paper and at its termination added: "It is unusual for there to be a discussion following a presidential address, but if any gentleman has any question to ask upon what he has heard, I shall be glad to answer it, if I can."

Major Duncan said that, as the member who had the privilege of proposing Major Dunkin's election to the exalted position which the latter now occupied, might he be permitted to begin by proposing a very hearty vote of thanks to him for the surprise he had given them. If, as the President had hinted, the paper they had been privileged to hear from him was in the nature of a precedent, they could only presume that it was so because previous occupants of the chair had had nothing so very worth while to say. (Laughter.) The rapt attention with which the address had been followed showed, at all events, that the precedent was regarded as a most valuable one. (Hear, hear.) As the President had permitted them also to depart from precedent by asking a question or two, he desired to take advantage of that concession.

[As stated above, the remainder of the discussion is reported elsewhere.—Ed.]

The President thanked Major Dunkin for his very kind remarks and the members for the hearty vote of thanks which was subsequently accorded him for his address. There being no other business, the meeting was declared closed.

The Annual Dinner.

The company, augmented by a number of visitors, subsequently celebrated the Annual Dinner of the Division, on the same premises. The time spent subsequent to the enjoyment of an excellent repast was largely devoted to pleasures of a social nature, speech-making being reduced to a minimum, and a capital musical programme was provided by Messrs. Hinton (baritone), Titcombe (tenor), and Veltom (entertainer).

Following the honouring of the loyal toasts, Mr. Brakespeare proposed that of "The Royal College of Veterinary Surgeons," saying that no one with his inexperience could be expected to deal with so important a toast in the manner it deserved. He could, however, boast acquaintance with and knowledge of many of the members of the College, for that was but one of many occasions upon which he had been the guest of one or other of the veterinary societies. (Hear, hear.) Whenever he received an invitation and saw upon it the word "veterinary," he immediately accepted it, and if one could judge of the governing body by the individual veterinarians one met, he did not hesitate to say that it must be a power in the land and a body to be reckoned with by others. (Applause.) It was, for example, an eloquent testimony to their powers of diplomacy and to their far-seeing statesmanship that, as he had been informed, they had been able to come to a satisfactory working arrangement with the Government of the Irish Free State in regard to the examination of students and the registration of graduates. (Hear, hear.)

In his view, too, the Royal College were but showing a due appreciation of the needs of the existing situation in determining upon an extension of their curriculum. He could quite understand that the young student was not too pleased at the realisation that he would have to study for five years instead of four, but he was certain that the future patients of those students would be duly thankful. (Laughter.) Veterinary students would reap a great deal of benefit from the additional clinical experience which would accrue from that extra year.

He understood that there was a good deal of prospective activity concerning the appointment of veterinary surgeons to local authority appointments, and doubtless their Council would do much to promote the interests of the members of the profession in connection with those appointments. When it came to the question of judging as to the suitability for consumption of the nation's food supplies—he referred especially to meat and milk—there was only one body of men competent to deal with them.

Mr. Brakespeare referred briefly to the advantages of the "one portal system" of entry to the profession—a system so jealously preserved, and rightly so, by the Royal College—and proceeded to say that their governing body appeared to him to have a tremendous amount of work to do; indeed, they started with the student, carried him along to graduation, and had by no means finished with him when he had acquired the magic letters M.R.C.V.S. (Laughter.)

In regard to certain individual members he had met, he was glad to think that they numbered amongst their company that evening the President-elect of the National Veterinary Medical Association, Lieut.-Colonel Simpson (cheers), who had recently rendered such service to the needy members of their profession and dependants by putting on a show for their benefit, and raising approximately £100. He thought that was a wonderful activity. (Cheers.) He must, of course, also speak of their President, Major Dunkin, and his wonderful laboratory research work. (Cheers.) His name, as a member of the Royal College of Veterinary Surgeons, would be honoured by future generations. (Hear, hear.)

Mr. G. P. Male, in response, thanked Mr. Brakespeare for the cordial terms in which he had proposed the toast of the Royal College. When he looked upon all the members of Council of that body present, it was borne in upon him that he was the wrong one to be chosen to reply (No, no), there was his old friend Mr. McIntosh, who would have done more justice to it, there was Colonel Walker, the President in the chair, Colonel Simpson and others not present that night. The Royal Counties V.M.A. was, he thought, noted for the number of members of Council R.C.V.S., it contained. (Hear, hear.)

He noticed that Mr. Brakespeare had made the mistake—made also by Cabinet Ministers and many others—of confusing the Royal College of Veterinary Surgeons and the Royal Veterinary College. There was a great difference between them, but there were certain things which were common to both, and one of them was a want of money. The Royal Veterinary College wanted £300,000, and he did not like to think what the Royal College wanted. (Laughter.)

He was very pleased to hear Mr. Brakespeare say that the Royal College really did a great deal of hard work: they thought they worked very diligently for the profession, and some of them thought that perhaps that work was not recognised as much as they would like it to be. Certainly the records of their activities that they read in their journal represented only a tithe of what was really accomplished, the bulk of the work being done in committee. When he told them that they often began on a Monday morning and did not finish until the Friday night, working the whole day long, they would realise something of the labour involved.

One of the most important things the Council had to do during the past year was to take part in the carrying through of the International Veterinary Congress, and he thought that was one of the most remarkable and successful Congresses ever held in Veterinary Science. (Cheers.)

Mr. Brakespeare had mentioned the curriculum. That was now engaging the attention of the Examination Committee of the Council. It had been under discussion for a number of years and he hoped it would soon see the light of day. The course of study would soon be five years instead of four, and the curriculum would be extended in various directions. He hoped, therefore, that the veterinary surgeon of the future would be better equipped than the veterinary surgeon of the present day—not that he meant to minimise in the least the equipment that the present-day veterinary surgeon obtained, which was equal, in many respects, to that given to the medical student. Whether, as Mr. Brakespeare had said, their patients would appreciate all that had been done, he did not know; nor indeed, whether the graduate of the future would get recompensed afterwards as he should be. He must thank Mr. Brakespeare for the very kind way in which he had proposed that toast, and the company for the manner in which they had received it. (Cheers.)

Mr. R. H. Keene, in a brief and racy speech, submitted "The Royal Counties Veterinary Medical Association." He had always been a very great admirer of the veterinary surgeon because the latter was always willing to go out and do the very best he could, whether he know anything about the illness or not. (Laughter.) He was suffering from a sense of disability and injustice in proposing the toast, because, whereas the President had carefully primed Mr. Brakespeare with information relative to the Royal College he (Mr. Keene) had been left entirely in the dark concerning the doubtless illustrious history and outstanding merits of that Association. (Laughter).

His pleasure at being invited to attend the Dinner, and his sense of the honour they had conferred upon him in setting him the duty of asking them to rise and drink to the health of their Association—which was, indeed, all he could do—were, however, very real indeed. That toast was coupled with the name of Major Dunkin, whom he had not had the pleasure of meeting hitherto, but he had seen a good deal in the papers about his research work in different directions, and he was sure they must be congratulated upon having, as the President of their Society, such a well-known and respected figure. (Cheers).

The President said that he had the responsibility of replying to the toast of the Royal Counties Veterinary Medical Association, and he found it about as much as his shoulders could carry, because he realised—not for the first time, but quite recently—that although he always had a very high regard for that Division, he had not thought as much of it as he should have done by reason of its great antiquity and the distinction of the people who numbered themselves amongst its past Presidents and other officers, whose names alone induced feelings of respect, if not of awe.

It had frequently occurred to him how it was that there existed in the minds of a good many members of that Division a very definite disinclination to move that Annual Meeting and that Annual Dinner from the historic town of Reading, and he recalled (through the good offices of their honorary and over-worked Secretary) that it was exactly 47 years ago and, as he thought he was right in saying, probably in that very room, that that Society first came into being. The Hon. Secretary had also informed him that the gentleman who brought that Society into being was one named Flanagan, and when they remembered that there was amongst their members to-day at least one gentleman whose father was one of the original founders of that great Society, he felt greatly honoured—as he told them at the beginning of their meeting that afternoon—in being in that position.

For the benefit of their friends Mr. Brakespeare and Mr. Keene he wanted to say what a difference there was in veterinary practice now as compared with the position 47 years ago. There was now none of that enmity and rivalry which existed between local practitioners: to-day, all were out for a common cause—to help the animal owner to the best of their joint ability. Nowadays men did not make it their business to set themselves out as better than their neighbouring colleagues: they simply worked as a team and they realised how valuable that team spirit was and how much more valuable it would become as time went on. He knew, too, that that idea was gradually, slowly—too slowly, some of them thought—permeating the minds of politicians and agriculturists and of the man in the street; and if that man (he took him in a symbolic sense) would only realise the efforts, the successful efforts, that were being made, both individually and collectively, by the members of the veterinary profession to make themselves worthy of their calling, he would appreciate that those efforts demanded his confidence and support.

He thanked Mr. Keene for the terms in which he had proposed the toast, and his hearers for the kindly way they had received it. He was looking forward to that loyal support which they gave to his predecessor, Major Duncan, and with his help and experience, and the encouraging assistance he was certain to get from their Secretary, Mr. Bell, he was sure that, with their constant attendance at meetings, they would have a very successful year, and that, by their work, they would be able, at the end of the year, to show that they had made themselves more worthy of the good opinions that Mr. Brakespeare, Mr. Keene and others had so kindly expressed concerning them. (Cheers.)

Mr. J. W. McIntosh now rose to say that, before they left that festive board, he was sure they would all wish to express their best thanks to Major Dunkin for his conduct in the chair during the afternoon. They looked forward to a very happy and successful year under his guidance from the chair. (Cheers.)

They would, he was confident, also like to associate with that a very hearty vote of thanks to the artists who had contributed so greatly to their enjoyment that evening. (Applause.)

The President having expressed his thanks, the evening was brought to an appropriate close by the singing of "Auld Lang Syne."

H. Bell, *Hon. Secretary.*

The best dairy cows produce in a month one-and-a-half times their weight in human food.

One of the highest producing dairy cows will produce as much human food in a year as 12 good steers.

Central Division.

Earlier in this issue of the *Record* will be found a report of the address (with discussion) given by Dr. P. P. Laidlaw, of the National Institute for Medical Research, Mill Hill, describing the work there carried out by Major G. W. Dunkin and himself during the past two years, and the experimental results achieved, in connection with the production of an anti-distemper serum. An address on this subject was to have been given by Major Dunkin, but he was prevented by indisposition from presenting it, and Dr. Laidlaw kindly stepped into the breach and gave a most able and an exceedingly interesting account of their recent distemper research at Mill Hill, consideration of which occupied virtually the entire evening, little other business being transacted at the meeting, which was held at 10 Red Lion Square, W.C.1, on February 5th, 1931.

The interest which members of the profession are displaying in distemper research development was exemplified in the very large attendance. The President (Captain G. Dunlop Martin) occupied the Chair, and there were also present Captain L. S. Balls, Mr. A. J. Beeson, Mr. W. Brown, Captain R. Bryden, Messrs. R. E. C. Bullen, H. Bywater, A. Cornish-Bowden, Major T. Dalling, Mr. R. Eaglesham, Dr. Tom Hare, Messrs. C. W. Howard, H. C. P. King, Herbert King and Neville S. King, H. D. Jones, Miss Gertrude Knight, Captain W. J. Leyshon, Major Glyn Lloyd, Captain J. H. Mason, Professor James McCunn, Major Eustace Montgomery, Major-General Sir J. Moore, Messrs. K. Ollerhead, A. B. Orr, W. Perryman, R. Scott, Dr. A. L. Sheather, Miss K. W. Shedlock, Lieut.-Colonel P. J. Simpson, Capt. A. Spicer, Mr. A. W. Stableforth, Mr. F. H. Stainton, Miss M. Stewart, Captain R. J. Stow, Mr. E. Lionel Stroud, Captain W. K. Townson, Messrs. A. S. Watson, D. E. Wilkinson, J. Willett, R. A. Willett, J. D. Williams, Professor G. H. Wooldridge, Dr. W. R. Wooldridge, Professor J. G. Wright and Captain J. F. Macdonald (Hon. Secretary). The following visitors were present: -Dr. P. P. Laidlaw, Messrs. J. K. Bateman, C. A. Buckner, J. C. Davidson, J. J. Davies,, Major W. Denington, Captain S. R. Douglas, Messrs. A. W. Greener, H. Greenfield, S. F. J. Hodgman, D. Johnston, Dr. R. A. O'Brien and Mr. R. H. Stalker.

The minutes of the previous meeting, which had been published in the *Veterinary Record,* were taken as read and were confirmed and signed.

Correspondence.

(1) From the following, apologising for absence:—Lieut.-Colonel E. P. Argyle, Major G. W. Dunkin, Messrs. G. N. Gould, G. H. Livesey, G. P. Male, Captain S. J. Motton and Mr. Mark Tailby.

(2) From Dr. F. Bullock, acknowledging the receipt of the Society's letter of recommendation regarding a Garnett Memorial Fund Annuitant, and stating that it would be placed before the Council of the Victoria Veterinary Benevolent Fund.

Arising out of the correspondence, the President said that he was sure they were all very sorry that Major Dunkin was prevented by indisposition from being with them and from taking that part in their proceedings that evening to which they had all looked forward.

The Hon. Secretary informed the Fellows that he had anticipated their wishes by sending to Major Dunkin a letter of regret at his enforced absence, of sympathy with him in his illness, and expressing the hope that he would make an early recovery. (Hear, hear.)

Nomination for Fellowship.—Major W. Denington, of St Albans, was nominated as a Fellow of the Society.

Morbid Specimens and Cases of Interest.

Mr. Herbert King exhibited part of the trachea of a cart-horse which, he said, was suffering from laryngitis, and was nearly suffocating. He inserted a tracheotomy tube and allowed it to remain in for about a fortnight, when, in consequence of the improved condition of the animal, he removed it. The horse worked on for six months when, while at work, he came on roaring very badly. He was brought back to the stable and, after remaining there for several days, became very much better, but suddenly the roaring recommenced to a greater degree than previously. The speaker thought that at the onset the tube was inserted too low, owing to the thickness of the sterno-thyro-hyoideus muscle, but he could not very well insert another tube as it would have been too low down in the trachea and the horse would have interfered with it by rubbing it against the manger or with the collar. The animal was now in a very distressed condition: the roaring was very pronounced, there was profuse perspiration, and he looked as though he would suffocate. Mr. King therefore had him destroyed. On *post-mortem* he expected to find some turning in and thickening of the edges of the cartilage, but, as they would see, that did not exist. The cause of the roaring was the existence of an abscess containing two or three ounces of pus at the back of the trachea, between the cartilaginous rings and the mucous membrane, occluding the lumen of the tube, probably due to a strangles infection. There did not appear to be any abrasion of the mucous membrane, and why the abscess should have formed in that particular situation he was at a loss to know. The horse was about 13 years old.

Mr. W. Perryman observed that Mr. King's case was unique in his experience. He had known abscesses to appear round the larynx after tracheotomy, and of course it was common to have permanent thickening of the cartilage subsequent to that operation, but he had never known the persistent, slowly-maturing abscess at the back of the trachea, as revealed at the *post-mortem* in this case.

Captain L. S. Balls said that at the last meeting of the Central Veterinary Society he mentioned a dog that was shot at by a neighbour, as the dog was worrying his fence. The photograph (exhibited) was an X-ray picture of the head of the animal. Two bullets entered the skull, passing over the top of the brain case, and they were still in position. The dog was still alive; in fact, it was fully recovered (to all appearances) within a fortnight of the shooting.

For the benefit of those members of the profession present who had not seen the anatomical skeleton for some years (laughter) he had brought a specimen of a bone of the horse's hind leg to show them. The animal met with an accident, having been run into by a motor-car. After the accident the horse was able to walk 300 yards to a stable, but had great difficulty in going downhill. The question was raised at their last meeting as to whether or not the

horse should have been destroyed on the scene of the accident. He was insured for £400, and on the morning he died the Insurance Company asked the speaker to give a certificate, to which request he replied that he would first have to make a *post-mortem*, when he would give them the result. On *post-mortem* it was found that the horse had a ruptured diaphragm, and that the large intestine was in the thoracic cavity. While the animal was alive he could feel crepitus in the stifle joint, but the horse had managed to walk after him from the stable into the yard. From the specimens shown the Fellows would see that two pieces of bone had been knocked off the head of the tibia.

Miss Gertrude Knight showed a live parrot (apologising for what she feared had been the introduction of a disturbing element into the meeting) which presented a curious growth at the side of the face. The growth had been there for many years and as the bird was a sort of family heirloom, it was to be hoped that something could be done for it. She was wondering whether anyone present could give her a little advice on the nature and treatment of the condition.

Professor G. H. Wooldridge thought that the growth might be either granulation tissue or malignant tumour. He should cut it out, inducing local pressure anæsthesia by distilled water.

From the chair, a cordial vote of thanks was accorded those who had brought forward morbid specimens or related cases of interest.

Address.—The President said that, as they were already aware, unfortunately Major Dunkin could not give them his paper that evening, but they were very fortunate in that Dr. Laidlaw had very kindly stepped into the breach. (Applause.) He had much pleasure in calling upon Dr. Laidlaw to address them.

Dr. P. P. Laidlaw prefaced his communication on dog distemper antiserum with an expression of his regret at the unavoidable absence of Major Dunkin, as there were certain aspects of the work which Major Dunkin had made peculiarly his own.

Dr. Laidlaw now entered upon the main portion of his discourse, describing the Mill Hill distemper serum experimentation with great lucidity, with the assistance of a number of charts illustrative of temperature reactions to the methods employed. The animated discussion which followed was most ably opened by Major T. Dalling.

At the conclusion of Dr. Laidlaw's reply, the President said that he would like to claim the privilege of proposing from the chair that the heartiest thanks of the Society be accorded Dr. Laidlaw for coming there and giving them the benefit of his own experience and that of Major Dunkin in working on that fell disease of distemper which, he thought they would all agree, was one of the most difficult diseases they had to meet as practitioners. He was sure they owed them a very great debt, and they would like Dr. Laidlaw to convey to Major Dunkin their very sincere regrets that he could not be there and their best wishes for his very speedy restoration to health. (Applause.)

Dr. Laidlaw having returned thanks, the meeting concluded with an acknowledgment of the President's conduct of the meeting.

J. F. Macdonald, *Hon. Secretary.*

Abstracts.

[**A Test of the Value of Vaccination against Bovine Contagious Abortion in Sweden.** Bergman, Arvid M., and Agren, E. Publication No. 20 from the State Veterinary Bacteriological Institute, Stockholm.]

The article discusses the subject as follows:—

(1) Preparation and use of vaccine; (2) mode of administration; (3) results of organised campaign of vaccination in the North of Sweden, together with some information as to condition of animal husbandry in these latitudes; (4) the effect of age of cattle on incidence of abortion; (5) the relation of abortion to retention of fœtal membranes; (6) the occurrence of chronic bursitis in cows of infected herds; (7) the rôle played by the bull in the spread of the disease.

Under (1) the trials of various vaccines are recorded, some producing fatal effects. The vaccine eventually used is prepared as follows:—

Cultures of *B. abortus* on agar slopes are incubated for two to three days. Cultures thereafter are mixed with 0·5 per cent. carbolic acid solution. The mixture is filtered through fine copper gauze which had previously been brought to red-heat (pieces of agar and of wool (wadding) are thus held back). Next the organisms are washed (by centrifugalising and removal of supernatant fluid) and fresh carbolic solution added. At first the concentration of the mixture was determined by microscopical bacterial counts. Until the beginning of 1920 the vaccine was prepared to contain 2,000,000,000 bacteria per c.c. That year the concentration was increased to 4,000,000,000 per c.c., which is still used. When it is ascertained what dilution is necessary to obtain this concentration the mixture is heated to 58° for two hours when the bacteria are killed.

A living vaccine has not been used, since, as is shown, abortion can be induced by such vaccines, so that their use may be dangerous, especially on farms recently infected, *e.g.*, farms where the natural infection has not spread throughout the site; a type of farm, in any case, where one should wait in order to obtain the greatest benefit from vaccination.

(2) *Administration.*—The vaccine is given subcutaneously three times at 8-10 day intervals. The doses are two, four and eight c.cs. respectively, that is 8,000,000, 16,000,000, 32,000,000 bacteria; then follow observations on temperature reactions, etc., after vaccination.

(3) The results on the majority of farms are favourable, a reduction in the number of abortions being obtained. Details (graphs and tables) are available. The preventive value of the vaccine is greater than the therapeutic.

(4) Under this heading an analysis of records is made to determine the influence of age on abortion. Abortion will occur at any age; so long as the cow may become pregnant so long may abortion supervene.

(5) Retention of the fœtal membranes occurred more often in infected than in free herds.

Under (7) some interesting observations are made as follows:—

The part played by the bull as a spreading agent can be discussed from instances which have almost the characters of an experiment. In the village of Vitan, in the parish of Ranea, abortion appeared on one farm in

1916. That year the brother of the owner of the infected farm permitted his cows to graze in the summer with those of the infected herd; whereupon the brother's cows all aborted the following year. During this time a bull kept amongst the infected cows was used indiscriminately for a large number of cows from other farms in the same village. The disease remained confined to the farms of the two brothers.

In the village of Mjöfjärden, disease appeared in 1916-17 on a similar farm. All cows aborted. A bull on this farm was used, without precautions, for the cows of neighbouring farms, but no disease appeared on these holdings either in 1916-17 or the following year.

In Over Morjärv the problem was exemplified from another standpoint. Abortion appeared on most of the farms of the village. A bull, kept on a non-infected farm, was used for both infected and "clean" cattle. The disease did not appear amongst the clean cattle on the farm where the bull was kept; neither had precautionary measures been taken against infection. The danger of infection from the bull during "service" does not appear to be so great as it was previously thought to be.

G. B. B.

[**Surgical Treatment of Crib-biters.** Staff Veterinary Dr. Flemming. *Zeitschrift für Veterinärkunde.* April, 1930.]

Hertwig, in 1870, operated successfully on confirmed crib-biters by section of the tendons of both sterno-maxillaris muscles. Gerlach reported favourably on the results of cutting both subscapulo-hyoideus muscles near the larynx. Hell resected the bodies of both sterno-maxillaris muscles and also advised simultaneous section of the spinal accessory nerve.

In 1897 Dieckerhoff reduced the frequency of the act of cribbing by neurectomy of the ventral branches of both spinal accessory nerves before they entered the sterno-maxillaris muscle. He obtained better results from myectomy of the sterno-hyoid and sterno-thyroid muscles. Träger resected the sterno-thyro-hyoid and sterno-maxillaris muscles with a probe-pointed myotome in the upper third of the neck.

Forssell in 1914 went further and removed portions of both sterno-thyro-hyoid and subscapulo-hyoid muscles as well as first the ventral branch of the spinal accessory nerve before its entry into the sterno-maxillary muscle, and later that muscle itself. In 1918 he altered his technique. The horse was cast on its back and the head packed up so that the nose made an angle of not less than 30° with the ground, in order to prevent injury to the recurrent nerve with consequent roaring. His object being to incapacitate the muscles concerned with crib-biting, he removed a portion of the sterno- and subscapulo-hyoid muscles at their amalgamation and subsequently a piece of the sterno-maxillaris and sterno-thyroid muscles. Up to 1926 he claims 80 per cent. successes, 10 per cent. improvements and 10 per cent. failures.

Becker's technique is somewhat similar, but he begins by removing the sterno-maxillaris muscles. Out of 25 cases he reports 13 complete recoveries, nine cases showing less frequent cribbing after one to 12 weeks and three deaths. Two cured horses became wind-suckers. Röder, who operates in the same way as Becker, reports, in 38 cases, 25 cures, four improvements, six no improvements, three deaths. Other writers claim 60-90 per cent. successes following Forssell's technique or developments of it.

The writer mentions six cases operated on by him and records four permanent cures, one horse which showed no recurrence while still under observation and one failure.

H. H.

[**Opening of the Lachrymal Ducts of the Horse with the Tear-duct Cannula.** Staff Veterinary Virchow. *Zeitschrift für Veterinärkunde.* May, 1930.]

Treatment of the lachrymal apparatus of the horse had been in vogue since 1890. Catheters, setons introduced by means of sounds and trephining have been employed.

Professor Neumann-Kleinpaul has taken advantage of the fact that a cannula or sound can easily be introduced through the distal opening or openings of the lachrymal canal in the treatment of diseases of the canal and of the eye itself. He has devised an instrument known as the "Träna-Cannula," which may be inserted 1-2 cm. into the lower end of the canal of the standing horse. A syringe is attached to the cannula by a rubber tube and solution expressed from it sprays from the inner canthus over the eye and down the cheek.

The animal seldom resents the treatment so administered and the instrument has been found most useful in cases of conjunctivitis and of injuries or catarrhal conditions of the eye and lachrymal canal.

The cannula is composed of aluminium and is grooved at its narrow end to prevent slipping out of the canal. It is made by Hauptner of Berlin.

H. H.

Colonial Veterinary Reports.

[**Annual Report of the Civil Veterinary Department of the Punjab, 1929-30.** Printed by the Superintendent, Government Printing, Lahore, price 4s. 6d. An 8vo. volume of 35 pages, with many tables, a map and five pages of illustrations.]

Mr. Quirke is the Director of Veterinary Services in the Punjab, the veterinary staff of which consists of eight superintendents, eight assistant superintendents, 22 deputy superintendents, 16 veterinary inspectors, 40 veterinary assistant surgeons, and 316 veterinary assistants. The expenditure on this Service amounted to £179,000. Mr. Taylor, Principal of the Lahore Veterinary College, officiated in Mr. Quirke's absence on leave.

The Punjab Veterinary Department, which was separated from the Department of Agriculture in July, 1928, has a definite programme aiming at:—

(1) The improvement of the stock both for draught and milk purposes.

(2) The control and cure of disease.

Disease.—Rinderpest was widespread; the mortality was 11,000 head. Serum inoculations were carried out on 97,800 cattle. Double inoculations were performed on 2,000 head.

Cattle numbering 114,000 received serum inoculations and 244,000 received vaccine against hæmorrhagic septicæmia.

Vaccinations against blackquarter were carried out on 19,000 animals.

Twenty-two centres for the treatment of surra were maintained, where 478 cases were treated in equines and camels, of which 448 were discharged as cured.

There are 270 veterinary hospitals in the Province. Over one million cases were treated. Outlying dispensaries have been established. Castrations to the number of 179,000 were performed.

Genetics.—At the Hissar Stock Farm, where 7,000 animals are kept, 950 calves, 540 lambs, and 100 kids were born. The average weight of the calves was 58 lb. Three-hundred and twenty-eight bulls were issued to districts.

On the Grantee cattle farms 1,750 selected cows are maintained, and 165 bulls were issued.

The observations on fodder production and improved feeding continue. Milk records are being kept.

Sheep and goat breeding in the districts is being encouraged, but "experience has definitely proved the unsuitability of the Merino in the hands of the illiterate sheep owner . . . . Only hardy, disease-resisting breeds can stand up to local conditions . . . . The Department will, therefore, in future, pursue its policy of improving the indigenous breeds by selection and better feeding."

Cattle shows and fairs to the number of 139 were held.

Education.—At the Punjab Veterinary College 192 students were under tuition. Sixty-one were admitted to the first year, and 16 passed the fourth year examination.

[**Annual Report of the Veterinary Department, British Somaliland, 1930.**]

Major T. A. B. Cocksedge, the Chief Veterinary Officer, is assisted by one Indian Salutri and four native assistants. During his absence on leave Mr. R. L. Cornell, of the Tanganyika Territory Veterinary Department, is acting.

Disease.—*Rinderpest.*—One outbreak occurred in cattle returning from Abyssinia, where it is prevalent. This was promptly dealt with, and Somaliland is now free.

Pleuropneumonia of bovines also exists in Abyssinia, into which country the Somali animals graze. Two small areas remain infected and in quarantine.

East Coast Fever is very mild, the virulence being lower than normal.

Trypanosomiasis.—Surra is common among camels. Diagnosis is effected both microscopically and by the mercuric chloride test. The efficacy of "Naganol" in treatment is remarkable. Native owners now realise this and are paying with sheep for the cost of the drug. *T. vivax* is suspected as the cause of "Melig" in cattle.

Genetics.—The Government Stud Farm is recovering from a bad setback due to famine. The policy is to grade up the local horse to a standard which has been set, maintaining all the hardiness and resistance while increasing size.

General.—Major Cocksedge travelled 5,000 miles by car and 700 miles on horse or camel, and was absent from his headquarters for an average of 16 days per month.

Every new motor car on the road means a horse off the road, and every horse off the roads means a nose-bag less for oats, is the terse summing-up of the fall in the price of oats by the Under Secretary of State for Scotland, Mr. Thomas Johnston, M.P.

In Parliament.

The following questions and answers have been recorded in the House of Commons recently:—

Milk and Dairies Order.

Mr. McShane asked the Minister of Health whether he has considered the resolution, a copy of which was sent to him, from the Walsall Town Council with regard to the amendment of the Milk and Dairies (Consolidation) Act, 1915, and the Milk and Dairies Order, 1926; and what action he proposes to take in the matter?

Miss Lawrence: My right hon. Friend has received this resolution from the councils of several county boroughs. He will consider it in consultation with my right hon. Friend, the Minister of Agriculture.

. . . . . .

Dog Licences (Regulations, Wales).

Major Owen asked the Financial Secretary to the Treasury whether he will issue instructions that the regulations relating to the exemption of farmers' dogs from licences shall be published in the Welsh as well as in the English language?

Mr. Pethick-Lawrence: The published regulations relating to the exemption from licence duty in favour of farmers' and shepherds' dogs are contained in the portion of the public notices, exhibited in Post Offices and elsewhere, whch explains how certificates of exemption can be obtained. These notices are already issued in both Welsh and English.

Major Owen: Is the hon. Gentleman aware that quite recently in Pwllheli farmers were prosecuted on this ground, and the magistrates agreed that they had not been able to understand the regulations in the English language?

Mr. Pethick-Lawrence: Naturally, I cannot answer a particular question as to a particular prosecution, but, in fact, I have in my hand a notice which is in Welsh, and I will show it to the hon. and gallant Member so that he can satisfy himself about it.

Major Owen: Will the hon. Gentleman read it?

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Pony Lamps.

Mr. Freeman asked the Secretary for Mines whether the experiments for using an electric cap-lamp for pit ponies have reached any conclusion; and, if so, whether it is his intention to authorise their use in mines?

Mr. Shinwell: With my permission, pony lamps are now being tried out at several mines in different coalfields, and I am prepared to extend that permission on a limited scale to other collieries. But before I give a general approval for the unrestricted use of safety lamps of this character, it is desirable that they should undergo extended trials under a variety of working conditions, in order to determine reliably the safest and most suitable design.

Mr. Freeman: Will the hon. Gentleman take that matter into account in dealing with the question of pit ponies and see if he can make rules?

Mr. Shinwell: Certainly.

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Dried Milk (Import Restrictions).

Mr. Turton asked the Secretary to the Overseas Trade Department what countries prohibit the importation of dried condensed milk; and what countries levy an import duty on dried condensed milk?

The Parliamentary Secretary to the Board of Trade (Mr. W. R. Smith): I understand the question relates to dried milk or milk in a powdered form. I am advised that the term "condensed milk" is not usually applied to these products. According to the information available, the importation of dried milk is prohibited in Australia. In the other British Dominions, in India, and in many British Colonies and foreign countries, the importation or sale of milk preparations not containing prescribed minima of milk fats, etc., is prohibited. As regards the second

The King's Highway.

A Plea for the Horse.

Under the above headings, the following letter appeared in *The Times* of March 25th.

Sir,—Rumour hath it that the Transport Authority is thinking out ways and means to drive the patient horse off the streets of London. The age of mechanization and the coming of the robot surely need little incentive, in a period when ironmongery, smell, and speed bid fair to maintain the record for killing off anything or anyone which stands in its way. Why aid it by ordering the horse off the streets? Why not live and let live? Let both win or lose on their merits. Why not?

Has it occurred to the interests now pressing the Ministry of Transport to experiment in this eliminating process what the result will be to industry in the trades which cater for the horse, and the special horse-drawn vehicles? I visualise the horse breeder, on the farm away in the country, his horse-men, and those employed in varying ways looking after that animal. What about that line in his farming business? Must that, like cereals, be allowed to be quietly choked by unjust conditions? And this, forsooth, we hear by order of the Transport Authority. I hope it is not true. It is neither just nor wise. I see the wagon builders, the harness makers, the blacksmiths (what few are left), and those who sell horse corn and fodder, and a few who grow the same here in Britain; yet all these have as much right to live in the land of their birth as the officials who may even now be considering the earliest and quickest method of throwing them upon the Employment Exchanges, in London, for a start. I beg a halt!

As representing a rural constituency I enter my protest against introducing this edge of the latest wedge to kill the horse trade, and its dependent industries, and for those unfortunate traders in the lines to which I have already referred, almost beaten out of business by the march of mechanization in this great city. I beg of those responsible to live and let live, and include the patient, slow, but safe horse, and the traders who cater for his utility and services for London and the provinces, in the fair use of the King's highway in the Metropolis.

Yours truly,
W. B. Taylor.

House of Commons.
March 23rd, 1931.

Poultry Housing Experiments.

The Agricultural Education Sub-Committee of the Middlesex County Council has issued two leaflets dealing with experiments in the housing of poultry. The first is a report of a two-years' experiment with White Wyandottes accommodated in night arks, which begun on November 11th, 1928, and ended on September 15th, 1930. Two groups of White Wyandotte pullets of the same age and breeding were divided between orthodox laying houses and night arks, and, despite some severe weather during the winters, the birds in the night arks gave the better results in egg yield. The conclusions arrived at by the officials who conducted the experiments are (1) that the slatted floor system of housing layers is cheap and efficient for White Wyandottes on light, well-drained land; (2) that the health of the birds so housed seemed to be better, and there is no apparent reason why other heavy breeds, or first crosses with a light breed, should not do equally well; (3) size of egg was definitely superior in the night arks; (4) the absence of scratching litter has no bad effect on egg yield, and though the runs suffer this is no detriment to poor herbage; (5) slatted floor housing has decided merits from the point of view of economy of initial cost, labour, and upkeep; (6) slatted floor housing is likely to be most successful on poor, light land and in fairly dry situations. It is also suggested that the plant should be moved annually so that full benefit may be derived from tearing up the coarse herbage. Further, no attempt should be made to run more than 200 birds to the acre.

The success of these experiments led Sir John FitzGerald to offer to finance a plant of 1,000 layers in slatted floor houses, for a test covering two egg-producing seasons, from July 1st, 1930, to September 30th, 1932. The second pamphlet issued by the Sub-committee contains a preliminary report of this experiment which is being conducted at Warren House Farm, Stanmore. The 1,000 hens, all first crosses, are accommodated in 20 slatted floor houses, 8-ft. by 7-ft., on four acres. The preliminary statement shows that a few eggs were laid in August and September, and that the percentage production was 5·77 in October, 23·71 in November, and 54·08 in December. A full report will be issued at the close of the experiment, and brief statements will be circulated quarterly.

Undulant Fever Investigations in Germany.

F. Weigmann (*Deut. med. Woch.*, February 13th, 1931, p. 284), working at Kiel, examined 3,535 specimens of serum between the end of January, 1928, and the end of August, 1930. Of these, 119 agglutinated *Br. abortus* to a titre varying from 1 in 50 to 1 in 20,000, the commonest titre being 1 in 1,000 to 1 in 5,000. Blood cultures were put up in 72 cases, but in only five instances was the causative organism recovered, even though an atmosphere of 10 per cent. CO_2 was maintained during incubation. Details were available concerning 91 of the reacting patients. In the majority of these there was a history of undulant, remittent, or intermittent fever, with a slow pulse, subjective well-being even with a high temperature, leucopenia with a relative lymphocytosis, and frequently a complete absence of physical signs, though splenic swelling, epididymo-orchitis, endocarditis, bronchitis, diarrhœa, or constipation, and joint pains and swellings were sometimes met with. In four patients giving a positive serum reaction the fever appeared to be due either to typhoid fever or to croupous pneumonia; in two other patients a mixed infection was present. Five persons were detected on farms who gave a positive serum reaction without any history of illness. The author considers that these persons were suffering from a latent infection. Such a condition he regards as being fairly common; he points out that quite frequently the onset of undulant fever follows some other illness or may apparently even be determined by a fracture, suggesting that a fall in the resistance of the body may allow a latent infection to become manifest. In 49 of the cases milk was probably the source of infection, in seven cases contact with infected cattle, in 20 cases both sources of infection were available, and in 15 cases no definite evidence was forthcoming. As regards sex, there were 85 men and 34 women. The youngest patient was 11 years old and the oldest 75 years, the commonest age being 20 to 40 years. The author thinks that the disease would be found in children if only a systematic examination was made of the blood serum in all doubtful cases of febrile illness.—*British Medical Journal.*

Lidsey Dawn, a British Friesian heifer, owned by Mr. T. W. Elliott, of Lidsey Lodge, Bognor Regis, has broken the British record for a heifer's milk yield in one year, her total output in the 365 days from calving being 2,291 gallons. She has displaced Burnham Primrose 2nd, a British Friesian heifer, bred and developed by Mr. W. J. Newman, of Essex, that gave 2,219 gallons in 365 days.

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part of the question, the tariffs of most countries impose duties on these products, the exceptions being the Irish Free State, certain Colonies, Denmark, Holland, Peru and the Dominican Republic.

Major Colville: Will the hon. Gentleman state the reason why the tariffs are applied by those foreign countries?

Collecting Fees from Slow Clients.*

Iowa veterinarians lose $150,000 a year by failure to collect their fees, and a very considerable additional sum by undercharging. Veterinary periodicals have stressed the importance of making collections and making them promptly, and of charging a reasonable fee. Veterinary colleges, on the other hand, have failed to live up to their responsibilities in this. A course in business methods should be a part of every veterinary curriculum.

A successful practitioner must make a profit on his work. He must do this to be successful. Some of the best qualified men professionally have not made a good business success and for this reason their professional success has been handicapped.

Some years ago, the Iowa Association drew up a list of fees. These were the fees which experience had shown were necessary to the successful conduct of a practice, and it was necessary to collect these fees. A veterinarian charging less or failing to collect his fees, is by this amount failing to conduct a successful practice.

Of course, a successful practice depends upon many other things, but the subject of this decision has to do with the collection of fees only. Experience has shown that the majority of one's clients will pay within a reasonable length of time, a few will pay at an unreasonable length of time, but a few must always be forced to pay.

The psychological time to collect a fee is when the service is rendered. Too many veterinarians show an undue haste when a case is finished to get into their automobiles to drive away to the next case or to get back to their offices. One minute's additional conversation with the owner at the time of leaving would cut down the charge entries on our books 25 per cent.

All agree that a personal interview is the best means of collecting, but nevertheless, statements should be sent regularly. The average practitioner in this state has from two dozen to 200 and upwards accounts on his books that have been there for years. Law suits are the only method that remains in old cases, and law suits should ordinarily be brought in the Justice Court. In this state, the Justice Court has jurisdiction in cases up to $100.00 and by the agreement of both parties, up to $300.00. The cost of bringing suit in the Justice Court is negligible. There is a Justice Court in each township, and if practical, the suit should be brought in the township where the client lives. However, the justice's jurisdiction is co-extensive with the county and the suit may be brought in the township where the veterinarian lives if deemed advisable or in any other township in the county.

A good day book record should be kept and this should be used in the Justice Court if the case is contested. However, a veterinarian's cases in the Justice Court rarely are contested. A good many will pay as soon as they get a notice that court action is being taken. Still others pay up promptly when a judgment is rendered. Even though a man may be judgment proof, he does not like the judgment hanging over him. It is good for ten years and can be collected if he acquires any property within that time.

* Notes from an address by P. E. Treman, Odebolt, Iowa, at the 43rd annual meeting of the Iowa Veterinary Medical Association, Des Moines, January 13th-15th, 1931. Reprinted from the March, 1931, issue of *Veterinary Medicine*, Chicago.

Agricultural Students.

In these days of depression it is satisfactory to know that farmers are not losing sight of the advantages of thorough training for their sons who are to follow them in business. The Ministry of Agriculture reports that nearly 2,200 students are attending training courses at agricultural colleges and farm institutes. Nor is the veterinary profession being neglected. The Royal Veterinary College in London is finding it difficult to cope with the number of students entering for training. It is the more unfortunate, then, that the College lacks the financial means to extend its usefulness.—*The Times.*

Notes and News.

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events.

April 7th.—**N.V.M.A. Extraordinary General Meeting**, 10 Red Lion Square, W.C.1, 2.45 p.m.
N.V.M.A. Council Meeting, 10 Red Lion Square, W.C.1, 3 p.m.
N.V.M.A. Committee Meetings, 2 Verulam Buildings, Gray's Inn, W.C.1:—Appointments, 10 a.m.; Parliamentary, 10.30 a.m.; Joint Meeting of Parliamentary and Veterinary Officers' and Public Health, 11 a.m.; Veterinary Officers' and Public Health, 11.30 a.m.; Organising, 12 noon.

April 8th.—R.C.V.S. Registration and other Committees. Victoria Veterinary Benevolent Fund Council.

April 8th.—Annual Meeting of the West of Scotland Division, N.V.M.A., at Glasgow.

April 9th.—R.C.V.S. Examination, Registration and Parliamentary Committees.

April 10th.—R.C.V.S. Library and Finance Committees. 2 p.m., **Council Meeting.**

April 14th.—Meeting of the Derbyshire Division, N.V.M.A., at Derby.

May 8th.—Last day for nominations to Council R.C.V.S.

May 21st.—R.C.V.S. Voting Papers and Annual Report issued.

May 28th.—Last day for return of Voting Papers R.C.V.S. Council.

June 4th.—**R.C.V.S. Annual General Meeting.** Victoria Veterinary Benevolent Fund, Annual Meeting.

June 15th-20th.—D.V.S.M. Examinations.

July 2nd.—**R.C.V.S. Annual Dinner.**

Aug. 22nd-28th.—N.V.M.A. Congress at Norwich.

Professor James Macqueen.

The information we are able to give our readers concerning the post-operative condition of Professor Macqueen continues, we are delighted to say, to be completely reassuring. Although the Past President of our Association must remain for a further period of a fortnight at the Hampstead General Hospital, his state of health continues steadily to improve, and now gives no cause for anxiety.

Personal.

Levée Presentations.—Among the presentations to His Majesty the King, on the occasion of the Levée held at St. James's Palace on March 25th, were the following:—Lieutenant Lawrence Coulding, Royal Army Veterinary Corps, on appointment, by Major-General William Anthony, C.B., C.M.G.; Lieutenant Alexander Kidd, Royal Army Veterinary Corps, on appointment, by Major-General William Anthony, C.B., C.M.G.; Lieutenant Joseph Tevlin, Royal Army Veterinary Corps, on appointment, by Major-General William Anthony, C.B., C.M.G.

Army Veterinary Service.

London Gazette—War Office—Regular Army.

March 24th.—Lieut.-Colonel G. P. Knott, o.b.e., having attained the age fixed for compulsory retirement, is placed on retirement pay (March 22nd).

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Movements of Officers.

Captain J. P. Hegarty, m.c., is at present on leave in this country from India until April 29th, he joins the Southern Command for duty on April 30th.

Major A. Hodgins, d.s.o., and Major D'A. S. Beck, sailed for India on March 13th, for a full tour of duty abroad.

Horse Shoeing in London.

Championship Award.

" The horseshoe making and horse shoeing championship of London and district was decided on Saturday, when the annual competition arranged in connection with the National Equine Defence League took place at the forge of Mr. F. Piper, Waterloo Street, Camberwell. Four fires were kept in full blast for several hours while skilled craftsmen shaped the iron shoes, fitted them to the hoofs of horses, and completed a neat job with necessary attention to balance," says *The Times* of Monday last.

" There were 13 competitors, whose ages ranged from 21 to 51, and all but three have been attending the London County Council farriery classes at the Borough Polytechnic. The contest was for the Holmes Champion Shield, presented by Mr. C. M. Holmes, honorary adviser in farriery to the National Equine Defence League, and eight other prizes, including a silver cup for horseshoe making and a silver cup for shoeing. The competition was a test of skill; speedy work was not encouraged. Each competitor was allowed 50 minutes to make two shoes and put one on the horse's hoof. Points were awarded for the making and fitting of the shoe. The champion shield was won by Mr. A. G. Berry, Camden Town, who also won the silver cup for shoeing and achieved the highest aggregate of marks for shoeing and shoe-making. The silver cup for shoe-making was won by Mr. J. Cook, Dulwich. Last year's winner of the champion shield, Mr. R. Lovell, Shepherd's Bush, was not a competitor on this occasion. Mr. Charles Richardson, farriery instructor for the County of Shropshire, was the judge.

" There has been a considerable decrease in the number of shoeing-smiths since the championship contests began 20 years ago, but it is estimated that there are still 1,500 farriers practising their craft in the London area. The use of the commercial motor-vehicle to a large extent has displaced the light horse and the trader's pony, but the heavy draught horse still fulfils a useful purpose, and London farriers take a pride in fashioning shoes for the still numerous draught horses of the Shire, Suffolk and Clydesdale types which are used for heavy haulage work at the docks and elsewhere. In recent years shoeing-smiths have had to adapt themselves to changing circumstances, and in some parts of the country acetylene welding has been found to be a very valuable side line.

" While for some years there was a decline in the horse shoeing industry, there has been little variation in the last two or three years, and it is believed that it has now reached a level below which it is unlikely to fall. Indeed, there is to-day a good demand for useful heavy horses, both in London and in the country. Farriers, at any rate, are satisfied that their craft is far from extinction. Their optimistic slogan is 'As long as there are Englishmen there will be horses.' "

Correspondence.

Letters to the Editor should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue.

All correspondence must bear the name and address of the contributor for publication.

The Editor does not hold himself responsible for the opinions of his correspondents.

The Treatment of " Tremblings " in Sheep.

To the Editor of The Veterinary Record.

Sir,—May I be permitted to offer an explanation of my position in regard to the article published in the *Veterinary Record* of March 21st, on the treatment of " Tremblings " in sheep.

I was not present at the meeting of the Craven Tenant Farmers' Association and am, therefore, not responsible for any of the remarks made at the meeting. I did not see the report of the meeting in the *Craven Herald* until I saw the extract in the *Record*, together with Mr. Lancaster's comments.

In the first place, I would explain that the suggested treatment is purely experimental. At present we have no evidence that it is likely to be successful in any large proportion of cases. Last year it was tried experimentally on a few farms, and though there were some successes, there was also a number of failures. I considered it desirable to give the treatment a further trial this season, as it is only by that means that we can obtain any reliable information as to its value.

There is no question of supplying farmers with syringes and gluconate, either at cost price or otherwise. I had suggested that I might be notified when cases occurred, so that I could visit the farms and carry out the treatment on a limited number of farms. The treatment will be purely experimental and under my personal supervision.

I would point out that in a moorland sheep district, such as the Craven district of Yorkshire, it would be difficult to get into early touch with cases of this nature through a veterinary practitioner, as he is very rarely called in to attend them.

It would certainly be no exaggeration to say that not one per cent. of the sheep which die in such a district have been attended by a veterinary surgeon. This is unfortunate, but it is quite understandable, having regard to the low value of such sheep and the inaccessibility of many of the farms. The fact is that it is purely a commercial question.

The question of whether it is right or wrong to inform farmers as to the nature of certain sheep diseases and the best means of combating them is one which I do not propose to discuss now, but it is certainly one which the profession will have to consider seriously in the future.

I can assure Mr. Lancaster that I have no desire to trespass on the preserves of veterinary practitioners, and I have always endeavoured to co-operate with them and to give them any assistance I could. In the work of investigating outbreaks of disease of an unusual nature amongst farm stock in Yorkshire, which I am occasionally called on to do, I invariably collaborate with the practitioner who has been in attendance on the cases. In the experimental treatment of " Tremblings " in ewes, however, this, for the reasons already explained, would be quite impracticable in the great majority of cases.

Yours faithfully,

H. G. Bowes.

Department of Agriculture,
The University, Leeds.

March 27th, 1931.

BAYER VETERINARY PRICE LIST, 1931.

Messrs. Bayer Products Ltd., have just issued their Veterinary Price List for 1931, in an attractive modern form. The list includes " Avertin," the new rectal anæsthetic for cats and dogs and " Omnadin for Large Animals," a non-specific vaccine which, we gather, has been introduced at the request of many veterinarians for the treatment of pneumonia, pleurisy and other acute febrile diseases.

The new Price List, with its considerably enlarged Therapeutic Index and details of the composition and indications of well-known " Bayer " remedies, will doubtless prove a useful guide to the purchasing veterinary surgeon.

We are informed that it has been found necessary to make an alteration in the discount to the profession, but the listed prices have been so adjusted that the nett prices to the veterinary surgeon are, for the most part, unchanged. In some instances they are lower, *e.g.*, Blackleg Vaccine (germ free filtrate) and Astibulin (Joint-ill serum).

Messrs. Bayer Products Ltd. intimate in their accompanying circular that, as in the past, the sale of their veterinary preparations is confined strictly to the profession.